THE CITY OF WINNIPEG

DESIGN, BUILD, FINANCE, (OPERATE) MAINTAIN THE CITY OF WINNIPEG'S SOUTHWEST RAPID TRANSITWAY (STAGE 2) AND PEMBINA HIGHWAY UNDERPASS

PROJECT AGREEMENT

SCHEDULE 18 – TECHNICAL REQUIREMENTS

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Appendix M – Guideline for Mill and Fill Pavement Rehabilitation Method, City of Winnipeg, 2010

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Appendix P – Drainage Criteria Manual, City of Winnipeg

Appendix Q – Accessibility Design Standards, City of Winnipeg, May 2010

Appendix R – CPTED Guiding Principles, City of Winnipeg, May 2006

Appendix S – Universal Design Policy, City of Winnipeg, December 5, 2001

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Appendix U – Transportation Standards Manual, City of Winnipeg, 2012 Update

Appendix V – Busway Planning and Design Manual, City of Winnipeg Transit Department, September 2004

Appendix W – Manual of Temporary Traffic Control on City Streets, City of Winnipeg (2015)

Appendix X – Manual for the Production of Construction Drawings, City of Winnipeg, Works and Operations Division, November 1984

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PART A - INTRODUCTION

A1. GENERAL

A1.1 This section covers the general technical requirements applicable to all management systems and plans, Design and Construction, and OMR Services of the Project. The information in the Technical Requirements, or as amended over the life of the Project, is organized as follows:

(a) PART A - INTRODUCTION;

(b) PART B - MANAGEMENT SYSTEMS AND PLANS;

(c) PART C - DESIGN;

(d) PART D - CONSTRUCTION;

(e) PART E - OPERATIONS, MAINTENANCE AND REHABILITATION SERVICES;

(f) PART F - HANDBACK REQUIREMENTS;

(g) Appendix A – City of Winnipeg Southwest Transitway Stage 2 – Transitway Design Requirements;

(h) Appendix B – City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report;

(i) Appendix C – Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65);

(j) Appendix D – Standard Structural Specifications;

(k) Appendix E – Standard Construction Details;

(l) Appendix F – RT Symbol Design Details;

(m) Appendix G – Bus Detection System;

(n) Appendix H – CN Guidelines;

(o) Appendix I – Manitoba Conservation and Water Stewardship Environment Act Licence No. 3121;

(p) Appendix J – Identification Standard, City of Winnipeg Water and Waste Department (May 31, 2013);

(q) Appendix K – Electrical Design Guide, City of Winnipeg Water and Waste Department, October 31, 2013);

(r) Appendix L – Policy on Snow Clearing and Ice Control, City of Winnipeg, September 28, 2011;

(s) Appendix M – Guideline for Mill and Fill Pavement Rehabilitation Method, City of Winnipeg, 2010;

(t) Appendix N – Tree Removal Guidelines, City of Winnipeg, March 1, 2014;

(u) Appendix O – Tree Planting Details and Specifications Downtown Area and Regional Streets, City of Winnipeg, May 1, 2009;

(v) Appendix P – Drainage Criteria Manual, City of Winnipeg;

(w) Appendix Q – Accessibility Design Standards, City of Winnipeg, May 2010;

(x) Appendix R – CPTED Guiding Principles, City of Winnipeg, May 2006;

(y) Appendix S – Universal Design Policy, City of Winnipeg, December 5, 2001;

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(aa) Appendix U – Transportation Standards Manual, City of Winnipeg, 2012 Update;

(bb) Appendix V – Busway Planning and Design Manual, City of Winnipeg Transit Department, September 2004;

(cc) Appendix W – Manual of Temporary Traffic Control on City Streets, City of Winnipeg (2015);

(dd) Appendix X – Manual for the Production of Construction Drawings, City of Winnipeg, Works and Operations Division, November 1984;

(ee) Appendix Y – Public Works Department Parks and Open Space Division Management Information Manual, Volume 1: Maintenance Guidelines, November 2, 2001;

(ff) Appendix Z – Inertial Profiler Profile Summary Sheet;

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(hh) Appendix BB – Acceptable Tree Species for Boulevard Planting, City of Winnipeg, November 2011;

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(jj) Appendix DD – Pembina Highway Underpass: Geometric Design Criteria

(kk) Appendix EE – Winnipeg Transit Comfort Stations (Bus Operator Washrooms);

(ll) Appendix FF – IGF Station Bus Parking for Post-Event Service

(mm) Appendix GG – IGF Station Overhead Pedestrian Walkway;

(nn) Appendix HH – U of M Southwood Lands Survey;

(oo) Appendix II – Proposed Brenda Leipsic Dog Park;

(pp) Appendix JJ – AT Path Functional Design – Pembina Highway at Jubilee Avenue;

(qq) Appendix KK– U of M Land Drainage;

(rr) Appendix LL– Southwest Transitway (Stage 2) and Pembina Highway Underpass Project - Baseline Noise Study;

(ss) Appendix MM – Bus Rapid Transit Project Southwest Transitway Corridor Geotechnical Investigation – Technical Memorandum;

(tt) Appendix NN – Access for Semi-Trailers for IGF Events;

(uu) Appendix OO – Thomson Funeral Home and Cemetery AT Path Connection; and

(vv) Appendix PP – AT Path Recommended Illumination.

(ww) Appendix QQ – (Draft) Natural Area Appraisal and Removal Guidelines, City of Winnipeg

(xx) Appendix RR – Woodland Restoration Specification to Meet Compensation Requirements

(yy) Appendix SS – Fairway Woods Visual Natural Screening

(zz) Appendix TT – AT Path for Chevrier at Pembina

(aaa) Appendix UU – Tree Removals in U of M Southwood Lands and University of Manitoba

(bbb) Appendix VV – Realigned Roadway through Southwood Lands

(ccc) Appendix WW – Westbound Southpark Drive Bus Stop Location (Revised 2016-02-16)

(ddd) Appendix XX – Design Submittal Requirements

(eee) Appendix YY – NHL Heritage Classic Ice Plant Access Detail

A1.2 In the event of any conflict or inconsistency between the sections/appendices of these Technical Requirements, such conflict or inconsistency shall be resolved on the basis that provisions shall be given priority depending on their source in accordance with and in the priority and order listed below:

(a) Schedule 18 – Technical Requirements:

(i) PART A - INTRODUCTION;

(ii) PART C - DESIGN;

(iii) PART D - CONSTRUCTION;

(iv) PART E - OPERATIONS, MAINTENANCE AND REHABILITATION SERVICES; and

(v) PART F - HANDBACK REQUIREMENTS.

(b) Appendices:

(i) Appendix B – City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report;

(ii) Appendix A – City of Winnipeg Southwest Transitway Stage 2 – Transitway Design Requirements;

(iii) Appendix C – Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65);

(iv) Appendix DD – Pembina Highway Underpass: Geometric Design Criteria

(v) All other *Appendices*.

(c) PART B - MANAGEMENT SYSTEMS AND PLANS

A1.3 References to section numbers in this Schedule are to section numbers of the Technical Requirements, unless expressly provided otherwise.

A1.4 References to Schedules in this document are references to Schedules in the Project Agreement, unless expressly provided otherwise.

A1.5 References to any standards, publications, policies, guidelines or other requirements in the Technical Requirements or the *Southwest Transitway Stage 2 – Transitway Design Requirements*, *Southwest Transitway Stage 2 – Functional Design Report*, and *Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65)* are to the standards, publications, policies, guidelines or other requirements that were in place as of the date of the Project Agreement.

A2. DEFINITIONS

A2.1 In this Schedule 18 – Technical Requirements, capitalized terms shall have the corresponding meaning as set out in Schedule 1 – Definitions and Interpretation or as defined below:

(a) **"Accepted Lane Closures"** has the meaning set out in E1.10.3;

(b) **"Active Transportation Path"** or **"AT path"** means a pathway to be used for any human-powered mode of transportation such as cycling, walking, skiing, skateboarding, etc. where the main emphasis is on travel for a specific purpose or to a specific destination; however, does not exclude travel for purely recreational purposes;

(c) **"Aesthetics Plan"** means Project Co's plan for the aesthetic theme of the Project prepared in accordance with the requirements set out in C19.2;

(d) **"Aesthetics and Landscaping Design Report"** means Project Co's report prepared in accordance with the requirements set out in C5;

(e) **"Agreement Year"** has the meaning set out in E1.11.4;

(f) **"Association of Professional Engineers and Geoscientists of Manitoba (APEGM)"** means the body that governs and regulates the practice of professional engineering and geoscience in Manitoba;

(g) **"As-Built Aesthetics and Landscaping Construction Report"** means Project Co's report prepared in accordance with the requirements set out in D4.7;

(h) **"As-Built City Structures Construction Report"** means Project Co's report prepared in accordance with the requirements set out in D4.4;

(i) **"As-Built CN Rail Infrastructure Construction Report**" means Project Co's report prepared in accordance with the requirements set out in D4.3;

(j) **"As-Built Construction Reports"** has the meaning set out in D3;

(k) **"As-Built Drawings"** means Project Co's drawings prepared in accordance with the requirements set out in D3;

(l) **"As-Built Transitway and Roadway Infrastructure Construction Report"** means Project Co's report prepared in accordance with the requirements set out in D4.5;

(m) **"As-Built Transitway Stations Construction Report"** means Project Co's report prepared in accordance with the requirements set out in D4.6;

(n) **"As-Built Utility Infrastructure Construction Report"** means Project Co's report prepared in accordance with the requirements set out in D4.8;

(o) **"AT Path Connection at Pembina"** means the new AT path connection from the west side of the Pembina Highway Underpass and the AT path of the Transitway;

(p) **"AT Path Connection to Hopewell Lands"** means the new at-grade AT path connection to be built between Hopewell Lands and Plaza Station;

(q) "Bare Pavement" means:

(i) A 90% snow-free condition for the full width of the pavement with no more than 1 cm of snow/ice cover on any portion of the non-bare surface;

(ii) Shoulder snow windrows and stockpiles are no more than 100 cm in height and are cleared from hydrants, guardrails, crosswalks and bus stops; and

(iii) Snowplowing of sidewalks, bus stop platforms and cycling corridor have been completed.

(r) **"Centrallized Traffic Control (CTC) System"** means the new rail traffic control system to be constructed along the CN Rivers subdivision in the vicinity of the CN Rail Bridge over Pembina and the CN Portage Junction.

(s) **"Chancellor Station"** has the meaning set out in C2.1(uu);

(t) **"Chevrier Station"** has the meaning set out in C2.1(dd);

(u) **"City Structures Design Report"** means Project Co's report prepared in accordance with the requirements set out in C5;

(v) **"Clarence Station"** has the meaning set out in C2.1(z);

(w) **"CN Letellier Rail Bridge over Bishop Grandin Boulevard"** means a rail bridge over Bishop Grandin Boulevard (Mile 2.46 CN Letellier subdivision);

(x) **"CN Rail Bridge over Pembina Highway"** means the new rail bridge to be built on a new alignment over Pembina Highway (Mile 2.65 CN Rivers subdivision);

(y) "**CN Rail Bridge over Transitway at the CN Wye (CN Letellier)"** means the new rail bridge to be built on a new alignment over the Transitway that will run below the east CN connection from the CN Rivers subdivision to the CN Letellier subdivision;

(z) **"CN Rail Bridge over Transitway at the CN Wye (WC02 Spur)"** means the new rail bridge to be built on a new alignment over the Transitway that will run below the west CN connection from the CN Rivers subdivision to the CN Letellier subdivision;

(aa) **"CN Rail Infrastructure Design Report"** means Project Co's report prepared in accordance with the requirements set out in C5;

(bb) **"CN Right-of-Way"** means all land included in Schedule 12 – Lands and Identified Encumbrances with CNR listed as the registered owner;

(cc) **"Commissioning Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(dd) **"Construction Management Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(ee) **"Construction Manager"** has the meaning set out in B2.15.2;

(ff) **"Construction Superintendent"** has the meaning set out in B2.15.3;

(gg) **"Demobilization"** means the removal of all equipment, supplies and incidentals from the Construction Period Lands, including those necessary for securing, signing, movement and staging, and establishment of offices, buildings, and other facilities

necessary for work on the Project, and includes the restoration of the Construction Period Lands to their original condition prior to Mobilization;

(hh) **"Demolition"** has the meaning set out in C26;

(ii) **"Design and Construction Schedule"** means Project Co's schedule for the Construction Period;

(jj) **"Design Check Engineer"** has the meaning set out in B2.14.4;

(kk) **"Design Lead"** has the meaning set out in B2.14.2;

(ll) **"Design Manager"** has the meaning set out in B2.14.1;

(mm) **"Design Review Engineer"** has the meaning set out in B2.14.5;

(nn) **"Detailed Design"** means the plans, specifications and drawings that Project Co is required to provide pursuant to the Project Agreement;

(oo) **"Document Control Manager"** has the meaning set out in B2.13.4;

(pp) **"Environmental Management System (EMS)"** means the system included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(qq) **"Existing Infrastructure"** means the infrastructure existing prior to Commercial Close including Stage 1 Infrastructure, Roadways, Transitways, AT paths, grade separated structures, pump stations, parking lots, Park and Ride facilities, stations, utilities, drainage systems, and signage that exist on the Lands and Stage 1 Lands;

(rr) **"Flagging"** means the protection provided, through the use of a flag person, against the movement of trains, rolling stock and other railway equipment whenever Project Co Parties or its equipment is within 25 feet of the centerline of the nearest railroad track or tall enough to fault the track should it topple;

(ss) **"Four Lane Week"** has the meaning set out in C18.4.2;

(tt) **"Handback Requirements"** means the minimum requirements for handback of the OMR Infrastructure at the end of the Project Term, including exit plans, procedures, standards, and reporting in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(uu) **"Hopewell Lands"** means the property owned by Hopewell Development, which is located on the west side of the existing CN Letellier subdivision/Manitoba Hydro Right-of-Way opposite Plaza Station, and bordered on the south by the Lot 16 Drain. This property is also known as the former Sugar Beet lands;

(vv) "**IGF Event Day**" means a day during any Contract Month in which a scheduled event is taking place at Investors Group Field including, but not limited to, Winnipeg Blue Bomber home games. An IGF Event Day commences at 12:01 AM on the day of each IGF Event Day and shall end at 3:00 AM of the following day;

(ww) **"IGF Station"** has the meaning set out in C2.1(ggg);

(xx) **"Imminent Danger"** has the meaning set out in E1.10.1;

(yy) "**Independent Quality Certifier**" has the meaning set out in B2.13.3;

(zz) "**Independent Safety Manager**" has the meaning set out in B2.15.7;

(aaa) **"Jubilee Ramp"** means the west ramp connecting both northbound and southbound Pembina Highway with the Jubilee Avenue via the Jubilee Overpass over Pembina Highway;

(bbb) **"Kiss and Ride"** means the facilities provided to accommodate passengers making a mode change between rapid transit and automobile passenger to complete their trips;

(ccc) "**Lane Closure**" means the closing of a lane of traffic on Existing Infrastructure, New Infrastructure, or OMR Infrastructure;

(ddd) **"Lead Construction Manager"** has the meaning set out in B2.15.1;

(eee) **"Lead Rail Manager"** has the meaning set out in B2.14.3;

(fff) **"Letellier Grade Separation"** means the new Transitway grade separation to be built across the Letellier rail line and industrial spur lines (Mile 2.06 CN Letellier subdivision);

(ggg) **"Manitoba Hydro Right-of-Way"** means all land included in Schedule 12 – Lands and Identified Encumbrances with Manitoba Hydro listed as the registered owner;

(hhh) "**Manitoba Hydro Transmission Line Relocation**" has the meaning set out in C22.4.1;

(iii) **"Markham Station"** has the meaning set out in C2.1(xx);

(jjj) **"McGillivray Station"** has the meaning set out in C2.1(w);

(kkk) **"OMR Demobilization"** means the removal of all temporary equipment, supplies and incidentals from the OMR Period Lands and Stage 1 Lands, including those necessary for securing, signing, movement and staging, and establishment of offices, buildings, and other facilities necessary for OMR Services on the OMR Infrastructure, and includes the restoration of the OMR Period Lands and Stage 1 Lands to their original condition prior to OMR Mobilization;

(lll) **"OMR Manager"** has the meaning set out in B2.16.1;

(mmm) "**OMR Mobilization**" means the temporary occurrence of Project Co on the OMR Period Lands and Stage 1 Lands for any preparatory works and operations initiated by Project Co, including those necessary to secure the OMR Period Lands and Stage 1 Lands, to install signage, for the movement and staging of personnel, equipment, supplies and incidentals, for the establishment of all offices, buildings and other facilities necessary for undertaking OMR Services on the OMR Infrastructure;

(nnn) **"OMR Monthly Report "** has the meaning set out in E1.6**;**

(ooo) **"OMR Schedule"** means Project Co's schedule for the OMR Period;

(ppp) **"Operational Maintenance"** means the care and maintenance of the OMR Infrastructure in accordance with the requirements set out in E3;

(qqq) **"Operations, Maintenance and Rehabilitation Plan"** or "**OMR Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(rrr) **"Park and Ride"** means the parking facilities provided to allow commuters to leave their vehicles and make a mode change from automobile to public transportation;

(sss) **"Parker Station"** has the meaning set out in C2.1(o);

(ttt) **"Peak Period"** is the three hour period when Roadway traffic is the heaviest. This can be either in the morning (am) from 06:00 to 09:00 or in the afternoon (pm) from 15:30 to 18:30;

(uuu) **"Pembina Highway Underpass"** means the underpass of the CN Rail Bridge over Pembina Highway;

(vvv) **"Performance Monitoring Report"** means Project Co's report that documents all Non-Conformances with Schedule 18 – Technical Requirements in the performance of the OMR Services which has resulted in Deductions, in accordance with Schedule 14 – Payment Mechanism in respect of the relevant Contract Month;

(www) **"Plaza Station"** has the meaning set out in C2.1(nn);

(xxx) **"Preventative Maintenance"** means the care and servicing of the OMR Infrastructure by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects in accordance with the requirements set out in E4;

(yyy) **"Professional Engineer"** means an individual who holds a certificate of registration to engage in the practice of engineering in Manitoba under The Engineering and Geoscientific Professions Act, C.C.S.M. E120, or any replacement legislation;

(zzz) **"Project Manager"** has the meaning set out in B2.13.1;

(aaaa) **"Protecting Foreman"** is an individual within the Project Co Party, qualified in the Canadian Rail Operating Rules. Protecting foremen are charged solely with the safe movement of trains and are not responsible for the safety of Project Co Parties' personnel or their equipment;

(bbbb) **"Public Communication Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(cccc) **"Quality Assurance"** or **"QA"** has the meaning set out in B4.5.4;

(dddd) **"Quality Assurance Manager"** has the meaning set out in B2.15.5;

(eeee) **"Quality Control"** or **"QC"** has the meaning set out in B4.5.3;

(ffff) **"Quality Control Manager"** has the meaning set out in B2.15.4;

(gggg) **"Quality Manager"** has the meaning set out in B2.13.2;

(hhhh) **"Quality Management System"** or **"QMS"** means the system included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(iiii) **"Rail Work"** means Design and Construction within the CN Right-Of-Way of the new rail grade separation structures, any Demolition of existing rail bridge structures, CN detours, temporary and new track relocations/upgrades, and any Related Infrastructure to be completed by Project Co or by CN;

(jjjj) **"Reconstruction"** means the removal and replacement of the existing pavement surface and pavement structure of a portion of Roadway within the Existing Infrastructure;

(kkkk) **"Rehabilitative Maintenance"** means the restoration of the OMR Infrastructure to its original designed use in accordance with the requirements set out in E5;

(llll) **"Risk Management Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(mmmm) **"Roadway"** means the City's transportation infrastructure within the Lands and Stage 1 Lands, comprised of street right-of-ways open to all Infrastructure Users and in some cases bus traffic, including, but not limited to, connections from adjacent streets to the Transitway or access to Park and Ride facilities, but not including Park and Ride facilities;

(nnnn) **"Safety Manager"** has the meaning set out in B2.15.6;

(oooo) **"Safety Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(pppp) "**Schedule of Lane Closures**" has the meaning set out in E1.11.4;

(qqqq) **"Snow Clearing and Ice Control Plan"** means the plan prepared by Project Co during the OMR Period in accordance with the Technical Requirements to address snow clearing, snow hauling, and ice control on the OMR Infrastructure;

(rrrr) **"Specified Utility Work"** has the meaning set out in C21.1.2;

(ssss) **"Stadium Access Maintenance"** has the meaning set out in E1.9.7(e);

(tttt) **"Stadium Access Works"** has the meaning set out in D7.2.1;

(uuuu) **"Stage 1 Infrastructure"** means the existing infrastructure (Transitway, Roadways, and stations, including the Jubilee station) built for the first stage of the City's Southwest Transitway which extends from Queen Elizabeth Way in downtown Winnipeg to the Jubilee/Pembina intersection including, the Harkness Avenue entrance and egress, Fort Rouge Yards Kiss and Ride, and the connections to Queen Elizabeth Way, Warsaw Avenue, the City of Winnipeg Transit Department

yard, Brandon Avenue, Hugo Street South, and the Jubilee Ramp. Stage 1 Infrastructure is a portion of the Existing Infrastructure;

(vvvv) **"Traffic Management Plan"** means the plan included in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement and further developed in accordance with the requirements set out in Schedule 18 – Technical Requirements;

(wwww) **"Transit Peak Period"** is the period when Transit traffic is the heaviest due to both Peak Period traffic of buses, vehicles and dead head buses traveling to the beginning of their route or the Transit garage. This can either be in the morning (am) from 05:00 to 09:00 or in the afternoon (pm) from 15:00 to 18:00;

(xxxx) **"Transitway"** is defined as the exclusive right-of-way within the Lands and Stage 1 Lands, for bus rapid transit and emergency vehicles, and is not open to general public traffic;

(yyyy) **"Transitway and Roadway Infrastructure Design Report"** means Project Co's report prepared in accordance with the requirements set out in C5;

(zzzz) **"Transitway Bridge over Bishop Grandin Boulevard"** means provision of a Transitway bridge over Bishop Grandin Boulevard;

(aaaaa) **"Transitway Bridge over Pembina Highway"** means the new Transitway bridge to be built over Pembina Highway;

(bbbbb) **"Transitway Overpass of McGillivray Boulevard"** means the new Transitway overpass to be built over McGillivray Boulevard;

(ccccc) **"Transitway Stations Design Report"** means Project Co's report prepared in accordance with the requirements set out in C5;

(ddddd) **"Transitway Underpass of CN Wye Tracks"** means the new Transitway underpass of CN Wye tracks to be built at the CN Portage Junction;

(eeeee) **"U of M Southwood Lands"** means the former golf course property acquired by the University of Manitoba for long-term development. This property has the extents of the entire golf course formerly known as the Southwood Golf Course;

(fffff) **"University of Manitoba Station"** has the meaning set out in C2.1(iii);

(ggggg) **"Utility Infrastructure Report"** means Project Co's report prepared in accordance with the requirements set out in C5;

(hhhhh) **"Utility Work"** has the meaning set out in C21.1;

(iiiii) **"Winter Months"** means the period from November 1 to April 30 every year; and

(jjjjj) **"Worker(s)"** has the meaning defined in The Workplace Safety and Health Act and Regulations.

A2.2 Words and abbreviations that are not defined in the Technical Requirements or the Project Agreement, which have well known technical or trade meanings and are used in the Technical Requirements, are used in accordance with such recognized meanings.

A2.3 Standard units of measurement may be abbreviated in the Technical Requirements.

A3. PROJECT BACKGROUND INFORMATION

A3.1 The City has a number of existing construction drawings and specifications that address elements of the Project. These documents are based on the City's past experience and best practices and will provide some guidance in the Design and Construction of the Project; however, they are not binding for the Project and are used at the sole discretion and risk of Project Co.

A3.2 The following Project Background Information has been provided:

(a) Additional geotechnical testing information;

(b) As-built and geotechnical information for existing structures within the study area. Note Route 165 is Bishop Grandin Boulevard:

(i) U230 – Route 165 Underpass (Mile 2.46 CN Letellier) – 1988 Relocation of Branch II Aqueduct;

(ii) U230 – Route 165 Underpass (Mile 2.46 CN Letellier) – 1989 CN Railway Bridge;

(iii) U230 – Route 165 Underpass (Mile 2.46 CN Letellier) – 1989 Pump Station;

(iv) U230 – Route 165 Underpass (Mile 2.46 CN Letellier) – 1990 Roadworks;

(v) U230 – Route 165 Underpass (Mile 2.46 CN Letellier) – 2005 Slope Failure;

(vi) U230 – Route 165 Underpass (Mile 2.46 CN Letellier) – 2011 AT path and Pedestrian Underpass;

(vii) B124 – Jubilee Overpass (Pembina Highway) – 2010 Rehabilitation;

(viii) B124 – Jubilee Overpass (Pembina Highway) – pre-2010 Rehabilitation;

(ix) U201 – Pembina Highway Underpass (Mile 2.46 CN Letellier) – Original Construction; and

(x) U201 – Pembina Highway Underpass (Mile 2.46 CN Letellier) – Upgrades and Rehabilitation.

(c) Utility records from the City;

(d) Fully executed CN agreement with the City;

(e) Summary of CN and their third party utility services along their right-of-way (Rivers, Letellier subdivisions);

(f) Preliminary cost estimates;

(g) Environmental assessment information;

(h) Handrail system details from the Fort Garry Twin Bridges Rehabilitation;

(i) Investors Group Field exterior concourse drawings;

(j) Land drainage information;

(k) Manitoba Hydro preliminary tower locations;

(l) Overhead sign structures (OHSS) drawings;

(m) Stage 1 Infrastructure drawings or reference information for the following:

(i) Example station record drawings;

(ii) Fort Rouge Tunnel tiling;

(iii) Osborne Station tiling; and

(iv) Fort Rouge Tunnel.

(n) Survey information;

(o) AutoCAD drawings of existing property, topographic plan and undergrounds as well as the functional design for the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report and preliminary design for the Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65);

(p) Transit bus information (turning radii, dimensions, bus specs, etc.);

(q) Underground information from University of Manitoba (U of M); and

(r) Property requirements.

A3.3 Information within the AutoCAD files is provided for convenience only. The Proponent/Project Co accepts full responsibility for verifying the accuracy and completeness of the data supplied in the AutoCAD files. City Advisors/City Parties accept no responsibility for data supplied in electronic format. Such data are not included under the seals of certificates, if any, on any accompanying plans or printed material. Hard copy data constitute the documents for record and working purposes. In the event of inconsistencies between electronic and hard copy data, the hard copy data shall govern.

PART B MANAGEMENT SYSTEMS AND PLANS

B1. GENERAL

B1.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term Project Co's Design and Construction Schedule and Project Co's Management Systems and Plans to comply with the Technical Requirements.

B1.2 Except as otherwise specifically provided in the Technical Requirements in relation to Permits, Licences and Approvals, Project Co is required, at its own cost and risk, to obtain all Permits, Licences and Approvals necessary for Project Co to fulfil the Technical Requirements.

B2. PROJECT CO TEAM STRUCTURE AND ORGANIZATION

B2.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term the team structure, organization, and resources in accordance with Project Co's proposal and as attached in Schedule 6 – Subcontractors and Key Individuals.

B2.2 At a minimum, Project Co shall provide the personnel outlined in B2.13.1 to B2.16.1 in accordance with the Proponent team structure and organization submitted for the Technical Submission.

B2.2.1 While a description of the responsibilities and qualifications for all requested personnel is outlined in the following sections, only the Key Individuals identified in B2.2.2 are subject to the terms identified in the Project Agreement.

B2.2.2 Key Individuals include the following Project Co Parties:

(a) Project Manager;

(b) Lead Rail Manager; and

(c) Lead Construction Manager.

B2.3 The responsibilities for each of the roles listed in B2.13.1 to B2.16.1 are based on the minimum expectations for personnel within these roles.

B2.4 Where the responsibilities for the roles listed in B2.13.1 to B2.16.1 would exceed the scheduling or capacity of the individual, Project Co may assign an additional staff member as back-up, although the intention is for each of these roles to be a singular role.

B2.5 An individual may be identified for multiple roles provided the individual is capable of fulfilling the responsibilities of the each role.

B2.6 Project Co may include additional personnel in management or leadership roles to supplement the Project.

B2.7 Unless otherwise approved by the City Representative, all of the roles listed in B2.13.1 to B2.16.1 shall be developed and staffed throughout the Project Term.

B2.8 Unless otherwise approved by the City Representative, the individuals assigned to the roles in B2.13.1 to B2.16.1 shall remain in that role. The intent of these roles is to maintain continuity throughout the Project Term.

B2.9 Where approved by the City Representative in writing, Project Co may substitute individuals in the roles listed in B2.13.1 to B2.16.1, with the exception of Key Individuals, providing they meet the requisite qualifications.

B2.9.1 Substitution of Key Individuals is subject to the terms of C8 of the Project Agreement.

B2.10 When any changes are made to the individuals, roles, or team organization, Project Co shall submit an updated team structure and organization in accordance with Schedule 5 – Review Procedure.

B2.11 Personnel responsible for quality management have been included in the roles listed in B2.13.2, B2.13.3, B2.15.4, B2.15.5, and B2.16.1 for clarity of structuring and team organization development. The requirements of the QMS for quality management shall govern the overall activities of the quality management personnel.

B2.12 Personnel responsible for safety management have been included in the roles listed in B2.15.6 and B2.15.7 for clarity of structuring and team organization development. The requirements of the Safety Plan for safety management shall govern the overall activities of the safety management personnel.

B2.13 General

B2.13.1 Project Manager

(a) The Project Manager is the technical leader of the Project for Project Co Parties and is responsible for planning and execution of technical activities of the Project throughout the Design and Construction, and OMR Period. The Project Manager is a Key Individual.

(b) Throughout the Construction Period, the Project Manager shall properly inform the OMR Manager of the work being undertaken.

(c) Responsibilities:

(i) Coordinate and oversee all managers and leads and ensure adequate communication between all Project Co Parties;

(ii) Ensure all managers and leads have sufficient information to undertake the task or activity they or their teams are responsible for;

(iii) Ensure adequate personnel are assigned to the Project to achieve the requirements of the Technical Requirements;

(iv) Oversee the regular and effective reporting of all managers and leads;

(v) Coordinate monthly updates to the Risk Management Plan;

(vi) Together with the Independent Certifier, prepare, implement, and oversee the Commissioning Plan; and

(vii) Liaise with the City Representative on an on-going basis to address all concerns related to the Project.

(d) Qualifications:

(i) Obtain Professional Engineer status as defined in A2.1(yyy) within one year of Financial Close;

(ii) Experience in management leadership for design and construction projects of similar scope and complexity, including transportation, transit, and infrastructure projects;

(iii) Experience in management leadership for alternative delivery design-build or P3 projects; and

(iv) Extensive experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.13.2 Quality Manager

(a) The Quality Manager is the leader of quality and the QMS system for the Project and is responsible for ensuring all Project Co Parties undertake their activities with the intention of a high quality product.

(b) Throughout the Construction Period, the Quality Manager shall properly inform the OMR Manager of the work being undertaken, with specific attention given to informing of the quality management activities that were completed. At the end of the Construction Period, the Quality Manager shall relinquish management of quality to the OMR Manager for the remainder of the Project Term.

(c) Responsibilities:

(i) Preparation of the QMS for the Project;

(ii) Overseeing the implementation of the QMS and on-going conformance to the QMS;

(iii) Manage all quality processes so the New Infrastructure is constructed in accordance with the Technical Requirements;

(iv) Ensure adequate personnel are assigned to the quality management of the Project;

(v) Oversee the hiring and assessment of assigned quality management personnel to ensure they meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(vi) Oversee the hiring and assessment of retained material testing laboratories and inspecting firms to ensure they meet the required certification for the task they are responsible for;

(vii) Monitoring of quality based on the QMS throughout Design and Construction;

(viii) Oversee the development and implementation of corrective and preventative actions and continuously monitor the QMS for improvement opportunities;

(ix) Ensure regular and effective reporting from the Design Manager, Document Control Manager, Quality Control Manager, Quality Assurance Manager, and OMR Manager. At a minimum, coordinate monthly meetings to review status of quality management for the Design and Construction activities. Ensure minutes of the meeting are taken, prepared and submitted to all parties;

(x) Ensure adequate input is provided by quality management personnel for the development of the As-Built Construction Reports described in D3;

(xi) Liaise with the City Representative on an on-going basis to address and resolve quality concerns of the City;

(xii) Identify, monitor, log, address, and resolve quality issues and non-conformance throughout the Design and Construction. Ensure proper documentation of quality issues and non-conformances is completed;

(xiii) Ensure regular communication with the OMR Manager throughout the Construction Period to inform them of how construction of the New Infrastructure is proceeding and how quality management is being achieved. At the end of the Construction Period, the Quality Manager shall pass the responsibility for leadership of quality and the QMS for the project during the OMR Period to the OMR Manager; and

(xiv) Provide input to the Design Manager for the preparation of the As-Built Construction Reports, in accordance with D4. Together with Design Manager, confirm the New Infrastructure was constructed in general conformance of the requirements of the QMS and Technical Requirements. This shall be achieved through stating conformance of the New Infrastructure in a cover letter to the As-Built Construction Reports described in D4.

(d) Qualifications:

(i) A Professional Engineer;

(ii) Experience with ISO 9001:2008 Standard with respect to quality management;

(iii) Experience in quality management for design and construction projects of similar scope and complexity and the management of staff and teams for the undertaking and reporting of quality activities; and

(iv) Relevant experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.13.3 Independent Quality Certifier

(a) The Independent Quality Certifier is to monitor and audit the Project independently of Project Co Parties to confirm the implementation and effectiveness of the QMS and that the QMS translates into a high quality design, workmanship in the field, and final product.

(b) The Independent Quality Certifier shall be available at all times and should have a direct and "hands on" approach throughout the Project.

(c) The Independent Quality Certifier shall be employed by a legal entity that is not carrying out any Design and Construction/OMR Services for the Project, and that is at arm's length from and completely independent of Project Co and any entity carrying out any Design and Construction/OMR Services for the Project.

(d) The Independent Quality Certifier shall have the authority to represent Project Co Parties and shut down any aspect of the Design and Construction/OMR Services in the event that quality is insufficient to meet the QMS and Technical Requirements.

(e) Responsibilities:

(i) Support the preparation, implementation, and on-going conformance of the QMS;

(ii) Support the resolution of quality issues and correction of non-conforming Design and Construction;

(iii) Monitor the auditing of the QMS, in accordance with B4.8, by Project Co Parties. Support the resolution of non-conformances of the QMS;

(iv) Liaise with the City Representative on an on-going basis to address and resolve concerns of the City with respect to quality and quality management;

(v) Monitor and confirm staffing is adequate to undertake quality management;

(vi) Support the Quality Manager in the hiring and assessment of assigned personnel to ensure they meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(vii) Support the Quality Manager in the hiring and assessment of retained material testing laboratories and inspecting firms to ensure they meet the required certification for the task they are responsible for;

(viii) Oversee all QA material testing, inspection, and quality activities to ensure all requirements of the QMS and Technical Requirements are being addressed and non-conforming Design and Construction/OMR Services is being rectified. At any time, the Independent Quality Certifier may be able to order additional QA activities to verify conformance of the Design and Construction/OMR Services to the QMS and the Technical Requirements. All coordination and costs associated with the additional QA activities shall be the responsibility of Project Co;

(ix) Support the development and implementation of corrective and preventative actions and continuously monitor the QMS for improvement opportunities;

(x) Liaise with the Design Manager in the field for on-going review and monitoring of the implementation of the design; and

(xi) At Substantial Completion, certify the quality of the Project and that Design and Construction was undertaken for a quality product in accordance with the Technical Requirements. Prepare summary documentation of quality management, with respect to Quality Assurance, as the basis of certification.

(f) Qualifications:

(i) Experience with ISO 9001:2008 Standard with respect to quality management;

(ii) Experience in the management of staff and teams for the undertaking and reporting of quality activities for design and construction (Quality Assurance or Quality Control) activities;

(iii) Experience in preparing, implementing, and monitoring of quality processes for alternative delivery design-build or P3 projects; and

(iv) Relevant experience in quality management on design and construction projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.13.4 Document Control Manager

(a) The Document Control Manager is responsible to oversee the tracking, storage and logging, and distribution of all Project related documentation and information.

(b) Responsibilities:

(i) During the development of the QMS, coordinate with the Quality Manager to determine response timelines for submission review. Response timelines shall be stated in the QMS for each type of submission;

(ii) Coordinate, track, and log the distribution of all Project documentation throughout the Design and Construction and OMR Period;

(iii) Document quality issues and non-conformances. At a minimum, prepare monthly summaries of quality issues and non-conformances;

(iv) Coordinate with design personnel to ensure design documentation is being properly tracked, logged, and distributed;

(v) Coordinate with quality management personnel to ensure quality documentation is being properly tracked, logged, and distributed;

(vi) Regularly prepare logs, including current status, for all Project documentation. At a minimum, this documentation log shall be completed weekly during the Design and Construction and monthly during the OMR Period; and

(vii) Liaise with the City Representative to facilitate review of Project documentation.

(c) Qualifications:

(i) The Document Control Manager shall have experience in the administration of construction projects, with emphasis on management of documents; and

(ii) The Document Control Manager shall have relevant administrative experience.

B2.14 Design

B2.14.1 Design Manager

(a) The Design Manager is the leader of design related tasks for the Project.

(b) The Design Manager is responsible for reinforcing that all Project Co Parties undertake their design related tasks with the intention of a high quality product.

(c) Responsibilities:

(i) Directly oversee the distribution of all design related work to the various Design Leads;

(ii) Monitor the completion of all design activities and development of all drawings and specifications;

(iii) Ensure adequate personnel are assigned for the completion of design, drawing, and specification development;

(iv) Ensure the assigned personnel meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(v) Oversee the compliance of the QMS throughout Design and Construction;

(vi) Oversee the checking and reviewing of the designs in accordance with B4.4.2;

(vii) Oversee the distribution of all designs, drawings, and specifications that are issued for construction, including subsequent amendments or revisions;

(viii) Ensure that all final design, drawing, and specification submissions that are issued for construction and subsequent amendments or revisions are sealed by the design engineer responsible for that aspect of the New Infrastructure and meet the requirements of the QMS and Technical Requirements;

(ix) Coordinate regular field visits to confirm the design is being adequately implemented for the New Infrastructure throughout the Construction Period. Included in the field visits shall be on-going discussions with the Quality

Manager, including the Quality Control Manager and Quality Assurance Manager as appropriate, to determine how quality management is being achieved on site;

(x) Oversee the review of all submittals and shop drawings;

(xi) Oversee the preparation of the As-Built Construction Reports described in D3. Ensure adequate input is received by quality management personnel for the development of the As-Built Construction Reports;

(xii) Confirm the New Infrastructure was constructed in general conformance of the requirements of the QMS and Technical Requirements. This shall be achieved through stating conformance of the New Infrastructure in a cover letter to the As-Built Construction Reports described in D4. The As-Built Construction Reports shall be sealed by the Design Manager and Quality Manager in accordance with the requirements of APEGM; and

(xiii) Monitor and confirm distribution, tracking, and logging of all design, drawing, and specification submissions.

(d) Qualifications:

(i) A Professional Engineer; and

(ii) Extensive design experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.14.2 Design Lead (Various)

(a) The Design Lead is the head of design related tasks for their specific discipline or component of the New Infrastructure and is responsible for the completion of design activities and the development of drawings and specifications.

(b) The Design Leads are expected to liaise and coordinate with other Design Leads as required to ensure the design requirements of each discipline or component of the New Infrastructure are being met and are complementary.

(c) Responsibilities:

(i) Coordination and distribution of design related work;

(ii) Coordination and completion of all design activities and development of all drawings and specifications;

(iii) Ensure adequate personnel are assigned for the completion of design, drawing, and specification development;

(iv) Ensure the assigned personnel meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(v) Ensure that all final design, drawing, and specification submissions that are issued for construction and subsequent amendments or revisions are sealed by the design engineer responsible for that aspect of the New Infrastructure and meet the requirements of the QMS and Technical Requirements;

(vi) Coordinate with the Document Control Manager to manage the distribution, tracking, and logging of all design, drawing, and specification submissions, including checking and reviewing processes, and those issued for construction as well as subsequent amendments or revisions;

(vii) Coordinate with the Design Check Engineer to ensure all designs are checked in accordance with B4.4.2;

(viii) For grade separation and earth retaining structures, coordinate with the Design Review Engineer to ensure all designs are reviewed in accordance with B4.4.2; and

(ix) Coordinate the review of all submittals and shop drawings with the engineer of record.

(d) Qualifications:

(i) A Professional Engineer; and

(ii) Relevant design experience on the discipline or component of the New Infrastructure they are responsible for.

B2.14.3 Lead Rail Manager

(a) The Lead Rail Manager is the leader for all railway design including, but not limited to, design of rail structures, rail shooflies, rail realignments, and any other Rail Work. The Lead Rail Manager is a Key Individual.

(b) The Lead Rail Manager shall be the main point of contact between Project Co Parties and CN during Design and Construction.

(c) Responsibilities:

(i) Responsible for ensuring conformance to the requirements of C22.7;

(ii) Provide support to the Design Lead(s) for any Rail Work;

(iii) Provide support to the Construction Manager(s) and Construction Superintendent(s) for any Rail Work;

(iv) Facilitate any discussions between Design and Construction personnel and CN;

(v) Directly oversee the implementation of Flagging for the Rail Work and New Infrastructure in accordance with C23.17; and

(vi) Address any concerns from CN regarding Design and Construction with Project Co Parties.

(d) Qualifications:

(i) Experience in management for railway construction projects of similar scope and complexity; and

(ii) Extensive railway experience on projects of similar scope and complexity.

B2.14.4 Design Check Engineer (Various)

(a) The Design Check Engineer is a Professional Engineer responsible for the checking of designs, drawings, and specifications for their specific discipline or component of the New Infrastructure.

(b) The role of the Design Check Engineer shall be implemented for all aspects of design for the New Infrastructure.

(c) The Design Check Engineer may be employed by the same legal entity completing the design, provided the Design Check Engineer was not involved in the design of that component.

(d) Responsibilities:

(i) Confirm adequacy of overall design rationale and methodology;

(ii) Complete a line-by-line review of all calculations and values;

(iii) Confirm adequacy of modelling and simulations used to undertake design activities;

(iv) Together with the Design Lead, identify and resolve any non-conformance in the designs; and

(v) Stamp and sign all applicable design reports, drawings, and specifications along with the engineer of record.

(e) Qualifications:

(i) A Professional Engineer; and

(ii) Relevant design experience in the discipline or component of the New Infrastructure they are responsible for.

B2.14.5 Design Review Engineer (Various)

(a) The Design Review Engineer is a Professional Engineer responsible for reviewing the designs, drawings, and specifications for their specific discipline or component of the New Infrastructure.

(b) The role of the Design Review Engineer shall be implemented for all grade separation and earth retaining structures including all related structures such as land drainage pump stations.

(c) The Design Review Engineer shall be employed by a legal entity that is not carrying out any design for the Project, and that is at arm's length from and completely independent of Project Co and any entity carrying out any design or design checking work for the Project.

(d) The Design Review Engineer shall provide independent design check notes and shall report that the design checks have been completed based on the information provided by the Design Lead (on behalf of the design engineer of record) and is satisfied that the designs meet the Technical Requirements.

(e) Responsibilities:

(i) Complete review of the design data drawings including re-analysis of all aspects of the original design including, geotechnical, geometric and operational safety components;

(ii) Complete review and re-analysis of all aspects of the original structural design, preferably (but not essentially) by a methodology other than that used in the original design to ensure that the design parameters are relevant, the structural system is sound and the structural members are appropriately sized and detailed;

(iii) Ensure that the engineering drawings and construction specifications accurately convey the requirements of the original design;

(iv) Ensure the completeness, integrity and accuracy of all aspects of the engineering drawings and construction specifications; and

(v) Together with the Design Lead, identify and resolve any non-conformance in the designs.

(f) Qualifications:

(i) A Professional Engineer; and

(ii) Extensive design experience in the discipline or component of the New Infrastructure they are responsible for.

B2.15 Construction

B2.15.1 Lead Construction Manager

(a) The Lead Construction Manager is the leader of the construction related tasks for the New Infrastructure for Project Co Parties and is responsible for the planning and execution of the construction of the New Infrastructure. The Lead Construction Manager is a Key Individual.

(b) Responsibilities:

(i) Coordinate the assignment of Construction Managers and Construction Superintendents for each discipline or component of the New Infrastructure;

(ii) Where appropriate, assign multiple Construction Managers and Construction Superintendents for each discipline or component of the New Infrastructure to ensure adequate coverage. For example, each bridge will likely require a different Construction Superintendent;

(iii) Ensure adequate on-going communication between the Design Lead and the Construction Managers;

(iv) Directly monitor the on-going design for each discipline and component of the New Infrastructure and determine if sufficient drawings and specifications are being provided to the Construction Managers to allow construction to maintain the Design and Construction Schedule. Where delays are identified, work with the Design Manager and Construction Managers to resolve and bring the Project into conformance with the Design and Construction Schedule;

(v) Directly monitor the on-going progress of construction for each discipline and component of the New Infrastructure and determine if the Design and Construction Schedule is being maintained. Where delays are identified, work with the Construction Managers to resolve and bring the Project into conformance with the Design and Construction Schedule; and

(vi) Ensure adequate personnel are assigned for construction to achieve the requirements of the Design and Construction Schedule and the Technical Requirements.

(c) Qualifications:

(i) Experience in construction management leadership for construction projects of similar scope and complexity, including transportation, transit, and infrastructure projects;

(ii) Experience in construction management leadership for alternative delivery design-build or P3 projects; and

(iii) Extensive management experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.15.2 Construction Manager (Various)

(a) The Construction Manager is the leader of the construction related activities for the discipline or component of the New Infrastructure they are responsible for.

(b) The Construction Managers are expected to liaise and coordinate with other Construction Managers as required to ensure the Design and Construction Schedule requirements of each discipline or component of the New Infrastructure are being met and the components are fully integrated.

(c) Responsibilities:

(i) Provide input to the Lead Construction Manager for the assignment of Construction Superintendents;

(ii) Through the Document Control Manager, obtain all drawings and specifications that have been issued for construction, including subsequent amendments and revisions. Distribute to the Construction Superintendents;

(iii) Facilitate the implementation of the New Infrastructure as detailed in the drawings and specifications;

(iv) Identify conflicts and contradictions in the drawings and specifications and issue documentation to the Design Leads for resolution;

(v) Where delays in the provision of drawings and specifications occur, provide notice to the Lead Construction Manager;

(vi) Through the Document Control Manager, issue all submittals and shop drawings to the appropriate Design Leads for review; and

(vii) Monitor the on-going progress of construction for each discipline and component of the New Infrastructure they are responsible for and determine if the Design and Construction Schedule is being adhered to. Where delays are identified, provide notice to the Lead Construction Manager and work together with the Construction Superintendent to resolve and bring the Project into conformance with the Design and Construction Schedule.

(d) Qualifications:

(i) The Construction Manager shall have experience in management of construction projects of similar scope and complexity, including transportation, transit, and infrastructure projects;

(ii) Experience in construction management for alternative delivery design-build or P3 projects; and

(iii) Relevant construction management experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.15.3 Construction Superintendent (Various)

(a) The Construction Superintendent is the leader of all field personnel responsible for Construction related activities for the discipline or component of the New Infrastructure they are responsible for.

(b) While the Construction Superintendent is not identified as an individual responsible for quality management as stipulated in B4, the Construction Superintendent is responsible for reinforcing that all Project Co Parties, performing work for the discipline or component of the New Infrastructure the Construction Superintendent is responsible for, undertake their construction related tasks with the intention of a high quality product.

(c) Responsibilities:

(i) Day to day coordination and management of all field personnel responsible for construction;

(ii) Regular reporting to the Construction Manager of all construction activities in the field;

(iii) A minimum of bi-weekly reporting on the Design and Construction Schedule to the Construction Manager and Lead Construction Manager. Where delays in the Design and Construction Schedule are identified, provide input to the Construction Manager on how to address;

(iv) Ensure adequate personnel are assigned for the Construction to achieve the requirements of the Design and Construction Schedule;

(v) Ensure the assigned Construction personnel have the necessary qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(vi) Distribution of construction related tasks to lead hands as appropriate. Direct monitoring and overseeing of leads hands where responsibility is delegated;

(vii) Together with the Quality Control Manager, coordinate and oversee the QC activities;

(viii) Facilitate the QA activities and liaise with the Quality Assurance Manager as required;

(ix) Identify quality issues and non-conforming work to the Quality Control Manager;

(x) Address and resolve items of poor quality and non-conformance as identified by any personnel responsible for quality management as stipulated in B4; and

(xi) Facilitate the implementation and on-going conformance of the Safety Plan in the field.

(d) Qualifications:

(i) The Construction Superintendent shall have experience in superintendence of construction projects and the management of staff and teams for the undertaking of construction activities;

(ii) Experience in superintendence for alternative delivery design-build or P3 projects;

(iii) For all grade separation and earth retaining structures, extensive construction experience in projects of similar scope and complexity, including transportation, transit, and infrastructure projects; and

(iv) For all other disciplines or components of the New Infrastructure, relevant construction experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.15.4 Quality Control Manager

(a) The Quality Control Manager is the leader of Quality Control for the Project and is responsible for reinforcing that all Project Co Parties undertake their activities with the intention of a high quality product.

(b) Responsibilities:

(i) During the development of the QMS, coordinate with the Quality Manager for the development of Quality Control testing and inspection requirements. At a minimum the requirements should meet those set out in B4.5.2;

(ii) Ensuring sufficient Quality Control personnel are in the field to monitor construction of the New Infrastructure and OMR Services and complete the necessary Quality Control activities;

(iii) Ensure the assigned personnel meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(iv) Ensure the retained material testing laboratories and inspecting firms meet the required certification for the task they are responsible for;

(v) Ensuring Quality Control personnel spend the majority of their time in the field directly monitoring construction of the New Infrastructure and coordinating or undertaking the Quality Control activities. Also ensuring the Quality Control personnel are effectively inspecting the New Infrastructure, documenting quality, identifying and addressing deficiencies, and resolving non-conforming work; and

(vi) Provide updates to the Quality Manager based on field conditions to assist in the identification, monitoring, logging, addressing, and resolving quality issues and non-conformance throughout the Design and Construction. During the OMR Period, this shall be communicated to the OMR Manager instead.

(c) Qualifications:

(i) The Quality Control Manager shall have experience in Quality Control of construction projects and the management of staff and teams for the undertaking and reporting of quality activities; and

(ii) Relevant Quality Control experience on projects of similar complexity, including transportation and infrastructure projects.

B2.15.5 Quality Assurance Manager

(a) The Quality Assurance Manager is the leader of Quality Assurance for the Project and is responsible for confirming that all Project Co Parties undertake their activities with the intention of a high quality product.

(b) Responsibilities:

(i) During the development of the QMS, coordinate with the Quality Manager for the development of Quality Assurance testing and inspection requirements. At a minimum the requirements should meet those set out in B4.5.2;

(ii) Ensure sufficient Quality Assurance personnel are in the field to monitor the New Infrastructure and Quality Control activities and complete the necessary Quality Assurance activities;

(iii) Ensure the assigned personnel meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(iv) Ensure the retained material testing laboratories and inspecting firms meet the required certification for the task they are responsible for;

(v) Ensure Quality Assurance personnel spend the majority of their time in the field directly monitoring the New Infrastructure and Quality Control activities, and coordinating or undertaking the Quality Assurance activities. Also ensure the Quality Assurance personnel are effectively inspecting the New Infrastructure and Quality Control activities, documenting quality, identifying and reporting deficiencies, and confirming resolution of non-conforming work; and

(vi) Provide updates to the Quality Manager based on field conditions to assist in the identification, monitoring, logging, addressing, and resolving quality issues and non-conformance throughout the Design and Construction. During the OMR Period, this shall be communicated to the OMR Manager instead.

(c) Qualifications:

(i) The Quality Control Manager shall have experience in Quality Control or Quality Assurance of construction projects and the management of staff and teams for the undertaking and reporting of quality activities;

(ii) A Professional Engineer; and

(iii) Relevant experience on projects of similar complexity, including transportation and infrastructure projects.

B2.15.6 Safety Manager

(a) The Safety Manager is the leader of safety for the Project and is responsible for confirming that all Project Co Parties undertake their activities in a safe and responsible manner.

(b) The Safety Manager shall ensure the safety of the Infrastructure Users is maintained at all times.

(c) Responsibilities:

(i) Prepare the Safety Plan for the Project;

(ii) Oversee the implementation of the Safety Plan and on-going conformance to the Safety Plan;

(iii) Manage all safety processes so Design and Construction and OMR Services are undertaken in compliance with the Safety Plan and Applicable Law;

(iv) Coordinate the health and safety training of all Project Co Parties who will attend or visit the site for construction during the Construction Period and for OMR Services during the OMR Period;

(v) As appropriate, coordinate the assignment of additional personnel for safety management and ensure they meet the required qualifications and experience, and have the knowledge for the task they are responsible for;

(vi) Monitor safety based on the Safety Plan throughout the Construction Period and the OMR Period;

(vii) Oversee the development and implementation of corrective and preventative actions and continuously monitor the Safety Plan for improvement opportunities;

(viii) Ensure regular and effective reporting from the Construction Managers and Construction Superintendents. At a minimum, coordinate monthly meetings to review status of safety for the Design and Construction and OMR Services. Ensure minutes of the meeting are taken, prepared and submitted to all parties;

(ix) Liaise with the City Representative on an on-going basis to address and resolve safety concerns of the City; and

(x) Identify, monitor, log, address, and resolve safety issues and non-conformance throughout the Construction Period and OMR Period. Ensure proper documentation of safety issues and non-conformances is completed.

(d) Qualifications:

(i) Experience in safety management for construction projects of similar scope and complexity and the management of staff and teams for the undertaking and reporting of safety activities; and

(ii) Relevant safety management experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.15.7 Independent Safety Manager

(a) The Independent Safety Manager is to monitor and audit the Project independently of Project Co Parties to confirm the implementation and effectiveness of the Safety Plan and that the Safety Plan translates into Construction Period and OMR Period services being undertaken in a safe and responsible manner.

(b) The Independent Safety Manager shall confirm the safety of the Infrastructure User is maintained at all times.

(c) The Independent Safety Manager shall be available at all times and should have a direct and "hands on" approach throughout the Project.

(d) The Independent Safety Manager shall be employed by a legal entity that is not carrying out any Design and Construction and OMR Services for the Project, and that is at arm's length from and completely independent from Project Co and any entity carrying out any Design and Construction and OMR Services for the Project.

(e) The Independent Safety Manager shall have the authority to represent Project Co Parties and shut down any aspect of the Project in the event that Design and Construction or OMR Services is insufficient to meet the Safety Plan and Applicable Law.

(f) Responsibilities:

(i) Support the preparation, implementation and on-going conformance of the Safety Plan;

(ii) Support the resolution of safety issues and correction of non-conformances;

(iii) Liaise with the City Representative on an on-going basis to address and resolve concerns of the City with respect to safety and safety management;

(iv) Monitor and confirm staffing is adequate to undertake safety management;

(v) Support the Safety Manager in the hiring and assessment of assigned personnel to ensure they meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(vi) Oversee all safety activities to ensure the requirements of the Safety Plan and Applicable Law are being addressed and non-conforming work is being rectified. At any time, the Independent Safety Manager may be able to implement additional safety activities to ensure conformance of the Project to the Safety Plan and Applicable Law. All coordination and costs associated with the additional safety activities shall be the responsibility of Project Co; and

(vii) Support the development and implementation of corrective and preventative actions and continuously monitor the Safety Plan for improvement opportunities.

(g) Qualifications:

(i) Experience in safety management for construction projects of similar scope and complexity and the management of staff and teams for the undertaking and reporting of safety activities; and

(ii) Relevant safety management experience on projects of similar scope and complexity, including transportation, transit, and infrastructure projects.

B2.16 Operations, Maintenance and Rehabilitation (OMR)

B2.16.1 OMR Manager

(a) The OMR Manager is the leader for the OMR Services and meeting the performance requirements during the OMR Period.

(b) The OMR Manager is the leader of quality for the OMR Services throughout the OMR Period and is responsible for ensuring all other Project Co Parties' personnel undertake their activities with the intention of a high quality product.

(c) Responsibilities – Design and Construction:

(i) Engage in regular communication with the Design Manager and Quality Manager throughout the Construction Period to determine how construction of the New Infrastructure is proceeding and how quality is being achieved. At the end of the Construction Period, assume overall project management and leadership of quality for the OMR Period.

(d) Responsibilities – OMR Period:

(i) Coordinate and oversee all OMR Services;

(ii) Ensure adequate communication between all Project Co Parties during the OMR Period and ensure all individuals have sufficient information to undertake the task or activity they are responsible for;

(iii) Ensure adequate personnel are assigned to the Project to achieve the requirements of the Technical Requirements for the OMR Services;

(iv) Ensure the completion of the on-going inspections, maintenance, and production and submission of the required reporting as outlined in the Technical Requirements;

(v) Liaise with the City Representative on an on-going basis to address all concerns related to the Project; and

(vi) Coordinate and manage the preparation for the handback workplan to ensure adherence to the Technical Requirements.

(e) Quality Responsibilities – OMR Period:

(i) Oversee the on-going conformance to the QMS;

(ii) Manage all quality processes so the OMR Infrastructure is maintained in accordance with the Technical Requirements;

(iii) Ensure adequate personnel are assigned to the quality management of the Project;

(iv) Monitor quality based on the QMS;

(v) Oversee the assessment of assigned personnel to ensure they meet the required qualifications and experience, and have sufficient knowledge for the task they are responsible for;

(vi) Oversee the assessment of retained material testing laboratories and inspecting firms to ensure they meet the required certification for the task they are responsible for;

(vii) Ensure the OMR Services are completed in accordance with PART E ;

(viii) Ensure the performance requirements in accordance with E6 are achieved;

(ix) Oversee the on-going implementation of corrective and preventative actions and continuously monitor the QMS for improvement opportunities;

(x) Identify, monitor, log, address, and resolve quality issues and non-conformance throughout the OMR Period. Documentation of quality issues and non-conformance shall be completed by the Document Control Manager with oversight by the OMR Manager; and

(xi) Liaise with the City Representative on an on-going basis to address and resolve quality concerns of the City.

(f) Qualifications:

(i) Experience with ISO 9001:2008 Standard with respect to quality management;

(ii) Experience in management for operations, maintenance, and rehabilitation projects of similar scope and complexity and the management of staff and teams for the undertaking and reporting of operations, maintenance, and rehabilitation activities;

(iii) Experience in quality management for operations, maintenance, and rehabilitation projects of similar scope and complexity and the management of staff and teams for the undertaking and reporting of quality activities;

(iv) Experience in operations, maintenance, and rehabilitation management for alternative delivery design-build or P3 projects; and

(v) Extensive experience on projects of similar complexity, including transportation, transit, and infrastructure projects.

B3. RISK MANAGEMENT

B3.1 Project Co shall perform a risk assessment to identify significant risks and appropriate mitigative strategies as they relate to the successful completion of the Project's implementation.

B3.2 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term the Risk Management Plan as attached in Schedule 4 – Project Co's Management Systems and Plans.

B3.3 The Risk Management Plan shall be submitted quarterly in accordance with Schedule 5 – Review Procedure.

B4. QUALITY MANAGEMENT SYSTEM

B4.1 General

B4.1.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, the Quality Management System (the "QMS"), as attached in Schedule 4 – Project Co's Management Systems and Plans. The relevant portion of the QMS shall be reviewed in accordance with Schedule 5 – Review Procedure prior to the start of that component of the Project. The overall QMS shall be reviewed in accordance with Schedule 5 – Review Procedure prior to Mobilization.

B4.1.2 The QMS shall be submitted quarterly in accordance with Schedule 5 – Review Procedure. Included in the submission shall be commentary on the QMS, including any significant incidents, trends, and corrective actions.

B4.1.3 The QMS shall be consistent with all of the requirements of the ISO 9001:2008 Standard, as amended or substituted from time to time, and shall cover all activities, products and services related to the Project, prior to the execution of these activities, products and services.

B4.1.4 The QMS shall address all stages of the Project, specifically Design and Construction, and OMR Services (including Operational Maintenance, Preventative Maintenance, and Rehabilitative Maintenance). The QMS shall include how Project Co will plan, develop, and implement the quality management processes needed to complete the Project including the Design and Construction, and OMR Period.

B4.1.5 The QMS shall stipulate how compliance with the Technical Requirements and Schedule 4 – Project Co's Management Plans is ensured. The QMS shall also stipulate how the performance of the QMS is being monitored and at what frequency. This shall include auditing, control of non-conforming product, and corrective and preventative actions. At a minimum, the time intervals stated in B4.8 shall be adhered to.

B4.1.6 During all stages of the Project, work shall not be started on any component of the New Infrastructure or OMR Infrastructure until after the QMS has been completed and implemented for that component of the Project.

B4.1.7 The QMS shall stipulate the documentation requirements for quality management and how these documents are controlled.

B4.1.8 The QMS shall outline the organization for quality management including an organization chart, methods of communication and contact information, and names of all individuals responsible for quality management.

B4.1.9 All records from the QMS for Design and Construction, and OMR Services, including all audits, shall be maintained and retained by Project Co for the duration of the Project Term or until otherwise agreed to in writing by the City Representative. The format of the records may be either paper or electronic. If Project Co chooses to retain the records in an electronic format, Project Co will be responsible to ensure that the electronic records are in a readable format at all times.

B4.1.10 Project Co shall make all QMS records available to the City for inspection and review. Project Co shall provide the City with a copy of any or all (detailed) quality records when requested.

B4.2 QMS Personnel

B4.2.1 Project Co shall provide sufficient QMS personnel to adequately implement the requirements of the QMS and Technical Requirements.

B4.2.2 All staff responsible for quality management, including Quality Control, Quality Assurance, monitoring, auditing, checking and reviewing, and certification shall be listed in the QMS. All individuals shall report to the Quality Manager, Design Manager, Quality Control Manager, or Quality Assurance Manager as appropriate.

B4.2.3 All staff responsible for quality management shall have a full understanding of the QMS and Technical Requirements related to the elements they are responsible for inspecting. All necessary information shall be provided to the quality management personnel, including drawings, specifications, standards, shop drawings, submittals, tolerances, and any design changes made throughout the Project Term.

B4.2.4 Personnel responsible for quality management shall have a full understanding of the Project and have the required knowledge, experience, and qualifications to adequately and effectively undertake quality management throughout the Construction Period and OMR Period.

B4.2.5 Quality management personnel not already listed in B4 shall have a full understanding of the QMS through training or technical training from a post-secondary institution. Quality management personnel shall provide certificates or other documentation validating the aforementioned training.

B4.2.6 Material testing laboratories and inspecting firms (e.g., welding inspection) shall be certified for the testing or inspection they are responsible for undertaking. All testing and inspection shall be in accordance with relevant standards and specifications.

B4.3 The QMS shall include, but not be limited to, B4.4 to B4.8.

B4.4 Design

B4.4.1 The QMS shall require all designs, drawings, specifications, and similar documents, for all aspects of the Project, be stamped and signed by a Professional Engineer.

B4.4.2 The QMS shall require two levels of design checks as listed below:

(a) The QMS shall require all design for the Project to be checked by a Design Check Engineer. The responsibilities of the Design Check Engineer shall include, but not be limited to, those found in B2.14.4; and

(b) The QMS shall require all design for the New Infrastructure grade separation and earth retaining structures, including all related structures such as land drainage pump stations, be reviewed by a Design Review Engineer. The responsibilities of the Design Review Engineer shall include, but not be limited to, those found in B2.14.5.

B4.4.3 Any inadequate design due to inappropriate or insufficient design rationale or methodology, calculations, or translation into drawings and specifications determined at any time, including after construction, shall be identified and reported by Project Co and discussed at the meetings held during Design and Construction or the OMR Period. Project Co shall outline the necessary modifications and continue to monitor, to ensure the New Infrastructure is in accordance with the Technical Requirements.

B4.5 Construction

B4.5.1 General

(a) The QMS shall provide for ensuring that the as-built New Infrastructure is in conformance with the Technical Requirements. Project Co shall implement a methodology to verify compliance of the construction with the design requirements.

(b) Construction works not following the Technical Requirements shall be identified and reported by Project Co and discussed at the meetings held during Design and Construction. Project Co shall undertake the necessary modifications and continue to monitor to ensure the as-built New Infrastructure conforms to the requirements of the engineering drawings and construction specifications.

(c) Changes made to the design during construction shall be stamped and signed by Professional Engineers from the design team. All changes shall be submitted to the Review Engineer for comment and revisions where necessary.

(d) At the end of the Construction Period, a Professional Engineer from the design team shall be required to stamp and sign a declaration that the New Infrastructure has been constructed in accordance with the engineering drawings and construction specifications.

B4.5.2 Testing and Inspection

(a) In general, the QMS shall be designed in accordance with the CSA standards. For all construction materials and products, the QMS shall detail the testing and acceptance program, including, but not limited to, the following:

(i) Material property or characteristics to be measured or inspected;

(ii) Test methods and reference standards;

(iii) Testing frequency;

(iv) Inspection criteria and frequency; and

(v) Criteria for product acceptance/rejection.

(b) The QMS shall require complete testing/inspection reports be prepared for the Project, including all test results and inspection activities for all New Infrastructure.

(c) The QMS shall outline the extent to which Project Co will undertake Quality Control and Quality Assurance activities (testing and inspection) and how it will be implemented.

(d) All Project Co Parties responsible for testing and inspection shall be appropriately certified for the tests and inspection they are undertaking. Certification of the testing and inspection companies shall be in accordance with CSA or other governing bodies, (i.e., American Concrete Institute, Canadian Council of Independent Laboratories) for all aspects of the New Infrastructure. Individual testers and inspectors shall conform to industry standard methods and specifications for undertaking their activities.

(e) At a minimum, certification shall include, but not be limited to:

(i) Concrete and aggregate testing shall be certified in accordance with CAN/CSA A283 – Category 1; and

(ii) Welding inspectors shall be in certified in accordance with CAN/CSA W178.2.

B4.5.3 Quality Control

(a) Quality Control (QC) shall be defined as the activities undertaken by Project Co Parties to ensure the individual processes of construction or components that comprise the final product of the Project are of sufficient quality to meet the requirements of the QMS and the Technical Requirements.

(b) Quality Control is to be undertaken at the lowest level of activity with oversight by the Quality Control Manager or designate. For example, Quality Control for steel girder fabrication could be completed by the fabrication facility with reporting to, and oversight by, the Quality Control Manager or designate.

(c) Individuals responsible for Quality Control shall be responsible for the daily quality management activities, including field testing, survey and layout, measurement, monitoring of construction activities, documenting, and general observation. They are also responsible to provide evidence on a daily basis that the Quality Control activities are meeting the required frequencies, is being performed by qualified staff,

and that the construction activities meet the required standard or specification and is within the specified tolerance.

(d) Project Co shall assign at least one quality management individual, responsible for Quality Control activities, for each major component of the Project as identified in C2.1. This quality management individual may be assigned to provide Quality Control duties for several components of the Project depending on the schedule and activities occurring at those locations, provided they are able to fulfill the requirements of the QMS and Technical Requirements.

B4.5.4 Quality Assurance

(a) Quality Assurance (QA) shall be defined as the activities undertaken by Project Co Parties to verify the individual processes of construction or components that comprise the final product of the Project are of sufficient quality to meet the requirements of the QMS and the Technical Requirements.

(b) Quality Assurance is to be undertaken at a higher level than Quality Control and should be separate from the Quality Control activities. For example, Quality Assurance for steel girder fabrication could be completed by an external member (i.e., not the fabrication facility) of Project Co Parties with reporting to, and oversight by, the Quality Assurance Manager or designate.

(c) Quality Assurance shall not be completed by personnel involved with Quality Control.

(d) Individuals responsible for Quality Assurance shall be responsible for reviewing, confirming, and monitoring the activities of those responsible for Quality Control. This will be achieved by also undertaking the daily quality management activities, including field testing, survey and measurement confirmation, monitoring of construction activities, documenting, and general observation. Through the daily management activities, the Quality Assurance personnel will be responsible for confirming Quality Control is achieving the required frequencies, being performed by qualified staff, and the construction activities are conforming to the required standard or specification and is within the specified tolerance.

(e) Project Co shall assign at least one quality management individual, responsible for Quality Assurance activities, for each major component of the Project as identified in C2.1. This quality management individual may be assigned to provide Quality Assurance duties for several components of the Project depending on the schedule and activities occurring at those locations, provided they are able to fulfill the requirements of the QMS and Technical Requirements.

B4.5.5 Discrepancies

(a) Discrepancies shall be considered as any testing or inspection where the findings between the QC and QA activities would mandate rejection over acceptance or would call into question the validity of the either of the quality management activities or quality of the New Infrastructure.

(b) All discrepancies shall be reviewed by the Quality Control Manager and the Quality Assurance Manager and the root cause shall be investigated to the satisfaction of the Quality Manager.

(c) All discrepancies shall be recorded, monitored, and addressed in a timely manner.

(d) Where immediate additional testing or inspection can verify the adequacy or rejection, or the root cause can be readily determined, followed by the appropriate acceptance or rejection, the discrepancy will not require formal reporting. For example, during concrete testing a test could read insufficient plastic concrete properties for one quality management party. If both parties agree to reject the concrete then the discrepancy is not necessary to report.

(e) Notwithstanding B4.5.5(d), consistent discrepancies, regardless if properly accepted or rejected, shall be reported to the Quality Manager.

(f) Discrepancies shall be communicated to the City's Representative, and where necessary, addressed appropriately.

B4.6 OMR Services

B4.6.1 The QMS shall ensure that the OMR Services of the Project conform to the Technical Requirements.

B4.6.2 Project Co shall update annually during the OMR Period, the plans detailing the OMR Services that will be conducted during the upcoming year to ensure that all requirements in the Project Agreement are met. The plans shall include information on scheduling, traffic management and communications with stakeholders.

B4.6.3 OMR Services not following the Performance Requirements shall be identified and reported by Project Co, and discussed at the meetings held during the OMR Period. Project Co shall undertake the necessary changes and continue to monitor to ensure the Performance Requirements are being met.

B4.7 Document Management

B4.7.1 Project Co shall be responsible for the management of all documents, including but not limited to: Project Co's Management Systems and Plans, Design and Construction Schedule, Permits, Licences and Approvals, design notes, design reports, drawings, specifications, standards, shop drawings, submittals, meeting minutes, meeting agendas, non-conformance reports, testing information and reports, inspection reports, certification reports, audits, and all subsequent revisions or updates.

B4.7.2 The primary storage method for documents shall be in a digital format. It is understood that Project Co may elect to create or update certain documents in hard copy format. However, all documents shall ultimately be converted to digital format for storage. For example, inspection reports or red-line markups of drawings may be completed in hard copy but final storage should be through scanning of documents to digital format or revisions to the original digital format files.

B4.7.3 Project Co shall provide the City, and other stakeholders as required, with methods of being incorporated into the document management system, such that issuing and receiving of documents is similar to that completed internally for Project Co Parties.

B4.7.4 Project Co shall track all documents for the Project and shall provide weekly updates of the tracking documents to the City Representative. Included in the tracking documents should include the party responsible for review and timelines remaining in accordance with Schedule 5 - Review Procedure as well as all other pertinent information (tracking number or equivalent, name, description, etc.) regarding that document.

B4.8 Audits

B4.8.1 Internal Audit

(a) Project Co shall undertake QMS Internal Audits, in accordance with ISO 9001:2008 Element 8.2.2, for the duration of the Project Term. The auditor shall follow the guidelines for Auditing Management Systems, ISO 19011:2002 standard, as amended or substituted from time to time. The audit shall, at a minimum, ensure that all input requirements are adhered to and that the QMS is implemented and in compliance with the requirements of ISO 9001:2008 standard, as amended or substituted from time to time, by customer requirements and applicable regulatory standards. All elements shall be audited at least once per year.

(b) The results of the QMS internal audit shall be documented in an audit report and shall be submitted by Project Co to the City Representative within seven days of audit completion.

(c) All QMS deficiencies identified by the internal QMS auditor during the audit shall be addressed, corrective measures implemented by Project Co within 30 days following release of the audit report.

B4.8.2 External Audit

(a) In addition to the internal audits, Project Co shall undertake QMS external audits for the duration of the Project Term.

(b) These external audits shall be conducted by an independent QMS auditor certified by a known auditor registration body such as International Register for Certificated Auditors (IRCA), Registrar Accreditation Board (RAB), National Quality Institute (NQI), or other equivalent body. The auditor shall also be qualified to audit the scope of the QMS. The audit process shall follow the guidelines for Auditing Management Systems, ISO 19011:2002, as amended or substituted from time to time. The audit shall, at a minimum, ensure that all input requirements are adhered to and that the QMS is implemented and in compliance with the requirements of the ISO 9001:2008 standard, as amended or substituted from time to time. A full system audit shall be completed within one year of signing the Project Agreement and thereafter at least once per year for the duration of the Project Term.

(c) The results of the QMS external audit shall be documented in an audit report and shall be submitted by Project Co to the City Representative within seven days of audit completion.

(d) All QMS deficiencies identified by the external QMS auditor during the audit shall be addressed, corrective measures implemented by Project Co within 30 days following release of the audit report.

B5. ENVIRONMENTAL MANAGEMENT SYSTEM

B5.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, the EMS, as attached in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement. The relevant portion of the EMS plan shall be reviewed in accordance with Schedule 5 – Review Procedure prior to the start of that component of the Project. The overall EMS shall be reviewed in accordance with Schedule 5 – Review Procedure prior to Mobilization.

B5.2 The EMS shall be submitted quarterly in accordance with Schedule 5 – Review Procedure. Included in the submission shall be commentary on the EMS, including any significant incidents, trends, and corrective actions.

B5.2.1 Project Co shall establish and maintain an EMS plan that outlines their EMS and includes:

(a) The scope of the EMS, including details of an justification for any exclusions;

(b) Documented procedures established for the EMS; and

(c) A description of the interaction between the processes of the EMS.

B5.3 The EMS shall be consistent with all of the requirements of the ISO 14001:2004 Standard, as amended or substituted from time to time, and shall cover all activities, products, and services related to the Project prior to the execution of these activities, products and services. The EMS shall address all stages of the Project, specifically:

(a) Design and Construction; and

(b) OMR Services.

B5.4 The EMS shall stipulate how it will ensure compliance with the following:

(a) Applicable environmental federal, provincial and municipal Permits, Licences and Approvals and legislation;

(b) The stated Project performance requirements as well as compliance with the intent of such requirements; and

(c) The EIA License No. 3121 dated December 18, 2014 and issued to the City of Winnipeg, including without limiting the generality of foregoing the Technical Requirements including the minimum requirements set out in the City of Winnipeg Southwest Transitway Stage 2 – Transitway Design Requirements.

B5.4.1 Clause 12 Parker Retention Pond of Appendix I – Manitoba Conservation and Water Stewardship Environment Act Licence No. 3121 is not a requirement of Project Co.

B5.5 During all stages of the Project, work shall not be started on any component of the Project until after the EMS has been completed for that component of the New Infrastructure or OMR Infrastructure. The EMS shall include, but not be limited to, the following:

(a) Monitoring and Inspection Programs

(i) The EMS shall provide for documented environmental monitoring and inspection programs that verify compliance with all the requirements. The documented programs shall include a description of:

- The scoping of the monitoring and/or inspection programs;
- Frequency of inspection and/or monitoring events and rationale for frequency;
- Listing of applicable performance requirement criteria (may include legislative requirements);
- Methodologies;
- Reporting; and
- The responsibilities and requirements for conducting inspections, monitoring programs, reporting results, and follow-up actions.

(ii) All deficiencies identified shall be addressed and corrective and preventative measures implemented by Project Co.

(b) Internal Audit

(i) Project Co shall undertake internal EMS audits, in accordance with ISO 14001:2004 Element 4.5.4, on a regular basis and in any event at least once per year for the duration of the Project Term. The auditor shall follow the current guidelines for Auditing Management Systems, ISO 19011:2002, as amended or substituted from time to time. The audit shall, at a minimum, ensure that all input requirements are adhered to and that the EMS is implemented and in compliance with the requirements of ISO 14001:2004 standard, as amended or substituted from time to time. All elements shall be audited at least once per year.

(ii) The results of the EMS internal audit shall be documented in an audit report and shall be submitted by Project Co to the City Representative within seven days of audit completion.

(iii) All EMS deficiencies identified by the internal EMS auditor during the audit shall be addressed and corrective measures implemented by Project Co within 30 days following release of the audit report.

(c) External Audit

(i) In addition to the internal audits, Project Co shall undertake EMS external audits for the duration of the Project Term.

(ii) These external audits shall be conducted by an independent EMS auditor certified by a known auditor registration body such as RAB, Canadian Environmental Certification Appeals Board (CECAB) or other equivalent body. The auditor shall also be qualified to audit the scope of the EMS. The audit process shall follow the current guidelines for Auditing Management Systems, ISO 19011:2002, as amended or substituted from time to time. The audit shall, at a minimum, ensure that all the input requirements are adhered to and that the EMS is implemented and in compliance with the requirements of ISO 14001:2004, as amended or substituted from time to time. A full system audit shall be completed within one year of the signing of the Project Agreement and thereafter at least once per year for the duration of the Project Term.

(iii) The results of the EMS external audit shall be documented in an audit report and shall be submitted by Project Co to the City Representative within seven days of audit completion.

(iv) All EMS deficiencies identified by the external EMS auditor during the audit shall be addressed and corrective measures implemented by Project Co within 30 days following release of the audit report.

B6. SAFETY PLAN

B6.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, the Safety Plan, as attached in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement. The Safety Plan for a specific component of the Project shall be reviewed in accordance with Schedule 5 – Review Procedure prior to the start of that component of the Project. The overall Safety Plan shall be reviewed in accordance with Schedule 5 – Review Procedure prior to Mobilization.

B6.2 The Safety Plan shall be submitted quarterly in accordance with Schedule 5 – Review Procedure. Included in the submission shall be commentary on the Safety Plan, including any significant incidents, trends, and corrective actions.

B6.3 Project Co shall be the "Prime Contractor", as defined in The Workplace Safety and Health Act and Regulations for all work on the Project by Project Co, Project Co Parties, City Parties, City Advisors, the Utility Companies relocating facilities in the Lands and Stage 1 Lands and any other contractor working within the Lands and Stage 1 Lands, work on adjacent lands, or other City Work as identified in advance by the terms of the Project Agreement, all in accordance with Workplace Safety and Health Act and Regulations.

B6.4 If any other contractor or Utility Company declines to work under Project Co acting as the Prime, then Project Co shall take measures to cooperate and coordinate Design and Construction activities in a mutually agreeable manner in accordance with Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement.

B6.5 The Safety Plan shall address all stages of the Project, specifically Design and Construction, and OMR Services. The Safety Plan shall include how Project Co will plan, develop, and implement the safety management processes needed to complete the Project including the Design and Construction, and OMR Services.

B6.6 The Safety Plan shall stipulate how compliance with Schedule 4 – Project Co's Management Plans and Applicable Law is ensured. The Safety Plan shall also stipule how the performance of the Safety Plan is being monitored and at what frequency.

B6.7 During all stages of the Project, work shall not be started on any component of the New Infrastructure and OMR Infrastructure until after the Safety Plan has been completed and implemented for that component of the Project.

B6.8 The Safety Plan shall stipulate the documentation requirements for safety management and how these documents are controlled.

B6.9 The Safety Plan shall outline the organization for safety management including an organization chart, methods of communication and contact information, and names of all individuals responsible for safety management.

B6.10 All records from the Safety Plan for Design and Construction, and OMR Services, including all audits, shall be maintained and retained by Project Co for the duration of the Project Term or until otherwise agreed to in writing by the City. The format of the records may be either paper or electronic. If Project Co chooses to retain the records in an electronic format, Project Co will be responsible to ensure that the electronic records are in a readable format at all times.

B6.11 Project Co shall make all Safety Plan records available to the City for inspection and review. Project Co shall provide the City with a copy of any or all (detailed) safety records when requested.

B6.12 Safety Plan Personnel

B6.12.1 General

(a) Project Co shall provide sufficient Safety Plan personnel to adequately implement the requirements of the Safety Plan and Applicable Law.

(b) All staff responsible for safety management shall be listed in the Safety Plan. All individuals shall report to the Safety Manager.

(c) All staff responsible for safety management shall have a full understanding of the Safety Plan and Applicable Law related to the activities they are responsible for. All necessary information shall be provided to the safety management personnel for the activities they are responsible for. Construction Superintendents shall be responsible to instruct any safety management personnel of the construction related activities and their safety implications.

(d) Personnel responsible for safety management shall understand the work and have the required knowledge, experience, and qualifications to adequately and effectively undertake safety management throughout the Construction Period and OMR Period.

(e) Safety management personnel shall have a full understanding of the Safety Plan through training or technical training from a post-secondary institution, or industry based training. Safety management personnel shall provide certificates or other documentation validating the aforementioned training.

B6.13 The Safety Plan shall include, but not necessarily be limited to the following:

(a) Monitoring and Inspection Programs

(i) The Safety Plan shall provide for documented safety monitoring and inspection programs that verify compliance with all the requirements. The documented programs shall include a description of:

- The scoping of the monitoring and/or inspection programs;
- Frequency of inspection and/or monitoring events and rationale for frequency;
- Listing of applicable performance requirement criteria (may include legislative requirements);
- Methodologies;
- Reporting; and
- The responsibilities and requirements for conducting inspections, monitoring programs, reporting results, and follow-up actions.

(ii) All deficiencies identified shall be addressed and corrective, and preventative measures implemented by Project Co.

(b) Internal Audit

(i) Project Co shall undertake internal safety audits on a regular basis and in any event at least once per year for the duration of the Project Term. The audit shall, at a minimum, ensure that all input requirements are adhered to and that the Safety Plan is implemented and in compliance with the requirements of Applicable Law. All elements shall be audited at least once per year.

(ii) The results of the internal Safety Plan audit shall be documented in an audit report and shall be submitted by Project Co to the City Representative within seven days of audit completion.

(iii) All Safety Plan deficiencies identified by the internal Safety Plan auditor during the audit shall be addressed and corrective measures implemented by Project Co within 30 days following release of the audit report.

(c) External Audit

(i) In addition to the internal audits, Project Co shall undertake Safety Plan external audits for the duration of the Project Term.

(ii) These external audits shall be conducted by an independent Safety Plan auditor certified by a known auditor registration body. The auditor shall also be qualified to audit the scope of the Safety Plan. A full system audit shall be completed within one year of the signing of the Project Agreement and thereafter at least once per year for the duration of the Project Term.

(iii) The results of the external Safety Plan audit shall be documented in an audit report and shall be submitted by Project Co to the City Representative within seven days of audit completion.

(iv) All Safety Plan deficiencies identified by the external Safety Plan auditor during the audit shall be addressed and corrective measures implemented by Project Co within 30 days following release of the audit report.

(d) Reporting

(i) Reported metrics should include but not be limited to "recordable" incidents, loss time incident rates, severity rates, total recordable incident rates as well as first aids and near misses.

(ii) These Project metrics will be provided to the City monthly; calendar summary, compiled on December 31 of each year.

B7. DESIGN AND CONSTRUCTION SCHEDULE

B7.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, until completion of the Project, Project Co's Design and Construction Schedule, as attached in Schedule 2 – Project Co's Design and Construction Schedule to the Project Agreement.

B7.2 Project Co's updated submissions of the Design and Construction Schedule shall be in accordance with B9.

B8. TRAFFIC MANAGEMENT PLAN

B8.1 Project Co shall further develop, implement, and maintain and shall monitor, update, and manage, for the duration of the Project Term, the Traffic Management Plan as attached in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement. The Traffic Management Plan for specific components of the Project or phases of the Project shall be reviewed in accordance with Schedule 5 – Review Procedure prior to commencing Design and Construction or OMR Services of that specific component of the Project.

B8.2 The primary objectives for developing the Traffic Management Plan for the Project are safety and to complete construction in the shortest possible time with the least possible disruption to affected businesses and private citizens who rely on the Existing Infrastructure for their travel. Refer to C18 for the requirements of the Traffic Management Plan during Design and Construction.

B9. CONSTRUCTION MANAGEMENT PLAN

B9.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, the Construction Management Plan, as attached in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement. The Construction Management Plan for a specific component of the Project shall be reviewed in accordance with Schedule 5 – Review Procedure prior to the start of that component of the Project.

B9.2 All submittals listed in this section shall be reviewed in accordance with Schedule 5 – Review Procedure.

B9.3 Bi-Weekly Project Meetings

B9.3.1 Project Co will be responsible to organize bi-weekly Project coordination meetings. These meetings will provide a general review and oversight of management and undertaking of the Project.

B9.3.2 These meetings shall be held for the entirety of the Construction Period.

B9.3.3 The intention of these meetings is for the Project team to work collaboratively towards solutions.

B9.3.4 Project Co's Construction Manager will be responsible to manage the meetings, minutes, coordination of information, and any drawings or reference material required for discussion at these meetings.

B9.3.5 As required, key stakeholder groups shall be invited to these meetings to discuss key Design and Construction activities.

B9.3.6 In respect of these meetings:

(a) Meetings shall be coordinated by Project Co's Project Manager;

(b) Project Co shall be responsible for preparing and distributing agendas and reference information required for discussion at the meeting;

(c) Project Co shall be responsible for taking minutes and action items at each meeting and maintaining a log of outstanding items, complaints, and issues that need to be resolved; and

(d) The meeting shall be attended by Project Co's Project Manager and any technical experts that are required to effectively communicate Design and Construction, and overall management activities to the City.

B9.3.7 The Project Manager will bring forward:

(a) High level review of on-going management of the Project;

(b) Complaints or comments received by the City; and

(c) Design and Construction Schedule updates with respect to overall completion.

B9.4 Weekly Design and Construction Communication and Coordination Meetings

B9.4.1 Project Co will be responsible for organizing weekly construction coordination meetings for each of the major components of the New Infrastructure listed in C2. Where approved by the City, Project Co may combine or eliminate components from the regular meetings. For example, it may be valuable to combine multiple stations into a single meeting.

B9.4.2 These meetings will provide a regular review and four week look ahead of the construction activities for the purposes of discussing drawings and specifications, coordinating construction activities, reviewing staging and operations plans, confirming any associated detours, and enabling the preparation of construction communication notices to affected properties and other key stakeholders.

B9.4.3 The meetings shall be held from the commencement of construction works for that major component(s) until completion of that component(s).

B9.4.4 The intention of these meetings is for Project Co Parties and City Parties to work collaboratively towards solutions.

B9.4.5 Project Co's Construction Manager will be responsible to manage the meetings, minutes, coordination of information and operations plans, and any drawings required for discussion at these meetings.

B9.4.6 As required, key stakeholder groups shall be invited to these meetings to discuss key construction activities.

B9.4.7 In respect of these meetings:

(a) Meetings shall be coordinated by Project Co's Construction Manager;

(b) Project Co shall be responsible for preparing and distributing agendas, operations plans, staging plans for discussion prior to each meeting;

(c) Project Co shall be responsible for taking minutes and action items at each meeting and maintaining a log of outstanding items, complaints, and issues that need to be resolved;

(d) The meeting shall be attended by Project Co's Construction Manager and any technical experts that are required to effectively communicate construction forecast and works to the City Representative and who have sufficient knowledge of the operations to describe work plans, and address Project Co's questions;

(e) Project Co's Design and Construction Schedule, Construction Management Plan, and processes shall ensure that it allows for a rolling advance look ahead of all construction works as outlined in the table below;

(f) Status of design shall be reviewed with attention given to components where the Design and Construction Schedule is not being maintained; and

(g) New work activities shall be presented at the weekly construction coordination meetings and should include a full description of the work (e.g., why work is required/who is doing the work/location of the work/work start and end date/times that the work will be undertaken, etc.) and any Construction Period Lands or neighbouring property impacts (e.g., access/dirt/noise/ dust/vibration/safety issues, etc.) other impacts, and service disruptions in an effort to minimize disruption to the Infrastructure Users and general public.

B9.4.8 The Construction Manager will bring forward:

(a) Updates on progress to the on-going activities in the Project;

(b) Utility Work and Specified Utility Work updates;

(c) Rail Work updates;

(d) Safety incidents;

(e) Infrastructure User or general public complaints or comments received through means outlined in Schedule 24 – Communications Plan or received by the City, which shall be reviewed at each meeting;

(f) Draft operational plans and staging plans submitted by Project Co. The City will provide comments for consideration and implementation as required;

(g) Risk review and updates; and

(h) Design and Construction Schedule updates, with respect to both design and construction activities.

B9.5 Project Co shall provide notification to the City Representative of the commencement of all construction activities related to City and CN structures, pump stations, and Transitway stations as noted in the following table:

Table 1: Look Ahead – Construction Notification Timelines

Apply to all Major Construction Activities	
Three months (90 days) advance notice	• Major Construction activities/Milestone Activities shall be flagged - particularity those that have significant impacts to the Infrastructure Users, neighbouring community, pedestrians and/or businesses. Examples include, but are not limited to, girder erection, final paving, and commissioning activities.
"Look ahead" schedule of future activities – 20 Business Days (or more if specified in a specific procedure)	• Project Co shall provide a "four week look-ahead schedule of activities" identifying upcoming works that are in development - scheduled four weeks in the future.
First review of proposed staging plans/relocations submitted in accordance with Schedule 5 – Review Procedure - 15 Business Days	• Project Co shall provide draft operational and staging plans.
Second review of plans submitted in accordance with Schedule 5 – Review Procedure - 10 Business Days	• The City conducts second review and feedback on revised operational plans. • Feedback from first review has been incorporated into plans.
Plans are finalized and submitted in accordance with Schedule 5 – Review Procedure; work is confirmed, - five Business Days	• Third Review and confirmation of activities. • Major and minor work plans are finalized by all parties.

B10. CONSTRUCTION PHOTOGRAPHS

B10.1 Project Co is to take photographs of the Existing Infrastructure before construction and Existing and New Infrastructure throughout the construction on a regular basis (several times, weekly for each site) and when problems or matters of particular interest or importance arise. Copies of such photographs shall be retained by Project Co until Final Completion of the Project and shall be identified with the following information:

(a) Date when photograph was taken;

(b) Location; and

(c) Description.

B10.2 Matters of importance or interest are to be photographed, such as:

(a) Site conditions prior to construction;

(b) General construction activities;

(c) Faulty work;

(d) Changes in nature of work;

(e) Damage to adjacent property;

(f) Completed New Infrastructure;

(g) Concealed New Infrastructure, prior to enclosure;

(h) Exposed underground Utility Infrastructure;

(i) Hazardous incidents;

(j) Traffic accidents;

(k) Deficiencies; and

(l) Warranty work.

B10.3 At a minimum, photographs shall be taken daily for construction works related to grade separation and earth retaining structures, major drainage culverts larger than 1.5 m in diameter, and noise attenuation barriers. Photographs shall be of sufficient quantity and detail to adequately summarize key tasks undertaken that day with the intention of providing the basis of how construction was undertaken. For example, on a bridge site the estimated number of photographs would typically range from 5-20 per day but may be more depending on the activities for that day.

B10.4 Identification of construction photographs for construction works related to stations, grade separation and earth retaining structures, major drainage culverts larger than 1.5 m in diameter, and noise attenuation barriers shall follow the following labels:

(a) Structure number – Date – Photograph Number, e.g., B### - YYYYMMDD - ###; and

(b) Station number – Date – Photograph Number, e.g., SW## - YYYYMMDD - ###.

B10.5 Construction photographs for construction works related to stations, grade separation and earth retaining structures, as well as major drainage culverts larger than 1.5 m in diameter that follow the labelling format above will not be subject to the identification requirements noted in B10.1.

B10.6 Structure numbers shall conform to those provided in C7.2 and C23.2.

B10.7 Station numbers shall conform to those provided in C9.

B10.8 All photographs shall be geo-referenced.

B10.9 A complete set of photographs, properly identified, shall be stored electronically by Project Co, be available to the City, and provided in electronic format to the City upon request. Type of electronic format (e.g., digital optical disc storage format, external hard drive, etc.) shall be at the discretion of the City.

B11. COMMISSIONING PLAN

B11.1 Project Co shall further develop, implement, maintain, monitor, update, and manage the Commissioning Plan, as attached in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement.

B11.2 The Commissioning Plan shall be finalized prior to completion of construction and shall present Project Co's adherence to the Technical Requirements with respect to Substantial Completion and the transition for the use of the New Infrastructure to the City.

B11.3 The Commissioning Plan shall provide detail to show that systems within the New Infrastructure, such as pump stations, detection systems, and all electrical, mechanical and heating, can be implemented for use prior to transitioning to the OMR Period.

B11.4 Commissioning of the New Infrastructure will not be effected until after the initial OMR Plan has been reviewed in accordance with Schedule 5 – Review Procedure.

B12. OPERATIONS, MAINTENANCE AND REHABILITATION PLAN

B12.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, the OMR Plan, as attached in Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement. Project Co shall prepare and submit on an annual basis and in accordance with the Technical Requirements, a specific and updated OMR Plan in accordance with Schedule 5 – Review Procedure. The plan shall be acceptable to the City and in place by September 15 for the following year.

B12.2 The OMR Plan shall be finalized prior to completion of Design and Construction and updated by March 1 of each Agreement Year, commencing in the first Agreement Year, with the exception of the snow clearing and ice control portion of the Plan (the Snow Clearing and Ice Control Plan).

B12.2.1 The Snow Clearing and Ice Control Plan shall be updated annually and reviewed in accordance with Schedule 5 – Review Procedure prior to September 15 of each year starting in the first Agreement Year.

B12.3 Project Co shall ensure that it addresses in the OMR Plan all of the components necessary to carry out the required OMR Services and Handback Requirements of the OMR Infrastructure safely, efficiently, and in the required condition as outlined in PART E and PART F of the Technical Requirements.

B12.4 The OMR Plan shall include, at a minimum, the services outlined in PART E . A high level schedule (OMR Services Schedule) in an acceptable scheduling program including all key inspection, Operational Maintenance, Preventative Maintenance, and Rehabilitative Maintenance tasks and milestones related to the OMR Services shall be included.

B12.5 The OMR Plan shall demonstrate compliance with the Technical Agreement with respect to performance obligations. It shall clearly describe Project Co's understanding and detailed approach to delivering all aspects of the OMR Services of the OMR Infrastructure relative to the specified performance requirements.

B12.6 Overall responsibility of the OMR Plan resides with Project Co and it is critical that its production be coordinated with all Project Co Parties to ensure that it encompasses the complete scope of the OMR Services to be delivered by Project Co under this Project Agreement. Project Co will deliver an OMR Plan which includes, at a minimum, processes and procedures to:

(a) Ensure compliance with the Project Agreement;

(b) Prepare and deliver complete and comprehensive documentation and records;

(c) Identify processes for management review of the OMR Plan;

(d) Identify, plan and prioritize all work activities required to perform the OMR Services and correct deficiencies;

(e) Document the sequence and interaction of all processes; and

(f) Detail procedures for service delivery.

B13. CITY REVIEW

B13.1 Project Co shall make all Design and Construction, and OMR Period documentation relating to the Design and Construction, OMR Services and handback of the OMR Infrastructure available to the City.

B13.2 Project Co and the City expressly intend and agree that neither acceptance by the City of Project Co's Design and Construction on the Project (as may be contemplated in the Technical Requirements) nor failure by the City to accept or otherwise participate in any manner in respect of the review of Project Co's Design and Construction on the Project shall in any way diminish Project Co's absolute responsibility under the Project Agreement to carry out the Project in accordance with the Project Agreement.

B14. HANDLING OF NON-CONFORMANCES

B14.1 For all Design and Construction and OMR Services, non-conformance of required outputs may be a deficiency in the characteristics, documentation or procedures that makes the quality of a product, activity or service unacceptable or not according to specified requirements and any other known acceptance criteria.

B14.2 For all Design and Construction and OMR Services, non-conformance shall also be considered as any contraventions of Project Co's management plans (in accordance with Part B – Management Systems and Plans), drawings, specifications, or the Technical Requirements.

B14.3 All references in the Technical Requirements to deficiency, non-compliance, defective, and discrepancy shall be interpreted as a non-conformance.

B14.4 Non-conformance is also any Design and Construction or OMR Services related activity that does not fully respond to any submittal endorsed "Comments" by the City or clearly reach acceptance or agreement from the City on the treatment or approach to the Project.

B14.5 Submittals shall be in accordance with Schedule 5 – Review Procedure. Any observed deficiencies identified in one submission and not addressed in a subsequent submission will be considered as non-conforming work. If Project Co perceives that any submittal endorsed "Comments" or request by the City is unreasonable, requires additional effort and is beyond the scope of work on the Project, Project Co is responsible to raise this concern in writing as a Dispute Notice and so notify the City in accordance with Schedule 7 – Dispute Resolution Procedure.

B14.6 Project Co shall address all non-conformances raised by the City. If Project Co perceives that any non-conformity raised by the City is unreasonable, requires additional effort and is beyond the scope of work on the Project, Project Co is responsible to raise this concern in writing as a Dispute Notice and so notify the City.

B14.7 Any non-conformance with the Technical Requirements shall be rectified by Project Co.

B14.8 In all instances, Project Co shall review and inspect remedial work and sign-off all the non-conformance reports. All remedial work shall be at Project Co's expense.

B14.9 False acceptance of deficiencies by any individual, which are clearly not in conformance, will not be tolerated by the City.

B14.10 Project Co shall maintain an up-to-date register of all non-conformance reports indicating their current status. A copy of all non-conformance reports shall be made available to the City and shall be submitted bi-weekly in accordance with Schedule 5 – Review Procedure.

B14.11 All deficiencies identified during the daily activity, inspections, audits and/or reviews (internal or external) shall be addressed, and corrective measures shall be implemented by Project Co. Project Co shall submit the results of all the corrective actions and disposition of all non-conformances to the City Representative.

B14.12 Project Co shall report all non-conformances to the City Representative in a timely manner. For all activities or components that directly impact the Design and Construction Schedule, timely reporting shall be considered to be notice within 48 hours. For all other activities and components that will not impact the Design and Construction Schedule, timely reporting shall be considered to be on a weekly basis.

B14.13 All non-conformances shall be highlighted at the Project co-ordination meetings, in accordance with B9, for each component of the Project they are associated with.

PART C DESIGN

C1. BACKGROUND

C1.1 Stage 1 of the Southwest Transitway, the initial phase of the City's rapid transit network, was constructed during 2009-2011. Stage 1 of the Southwest Transitway (3.6 km in length, located between downtown and Pembina Highway and Jubilee Avenue, with three stations) opened for service in April 2012 and is used by a bus rapid transit (BRT) network of 13 routes, providing fast, frequent, reliable service throughout the day on all days of the week. Rapid transit routes access the Transitway at four locations to provide trips without transfer for passengers travelling between the southwest part of the City and downtown.

C1.2 The Project shall consist of the Design and Construction and OMR Services of the Pembina Highway Underpass and a 7.6 km extension (Stage 2) of the existing Southwest Transitway, south from Pembina Highway and Jubilee Avenue to the U of M. The Transitway portion of the Project makes use of land within Manitoba Hydro and CN Rail rights-of-way for most of its alignment. This alignment, recommended in the Southwest Rapid Transit Stage 2 Alignment Study, completed and subsequently approved by City Council in 2013, provides an opportunity to deliver rapid transit service on an exclusive Transitway directly to the U of M, downtown, and several neighbourhoods in the southwest and west parts of the City of Winnipeg.

C2. SCOPE OF WORK

C2.1 The New Infrastructure includes, but is not limited to, the major components of the Project and any other activities necessary or incidental to the successful completion of the Project, as described below, including all appurtenances to support the Design and Construction of the following:

(a) Closure of the back lane between Manahan Avenue and Chevrier Boulevard from Hervo Street to French Street;

(b) The widening, realignment, and Reconstruction of Pembina Highway by an additional northbound lane beneath the Jubilee Overpass to create a six lane facility with three lanes in each direction;

(c) Replacement of the CN Rail Bridge over Pembina Highway on a new alignment (CN Rail Bridge over Pembina Highway) that includes CN Detours and relocation of the CN Rivers subdivision (i.e., the mainlines) and the CN Letellier subdivision at the CN Portage Junction, and associated retaining walls;

(d) Demolition of the existing CN Rail Bridge over Pembina Highway;

(e) A new Pembina Highway land drainage pump station and any Related Infrastructure to improve overall drainage;

(f) The relocation of municipal utilities to accommodate the lowering of Pembina Highway;

(g) Reconstruction of Pembina Highway from approximately Point Road/Windermere Avenue to Stafford Street;

(h) Closure of the median opening on Pembina Highway to Harrow Street;

(i) Improvements to the pedestrian and active transportation facilities adjacent to Pembina Highway between Point Road and Stafford Road, including connection of the west AT path along Pembina Highway with the AT path of the Southwest Transitway (AT Path Connection at Pembina);

(j) Construction of retaining walls along Pembina Highway and active transportation facilities on both sides of Pembina Highway in the vicinity of the Pembina Highway Underpass of Jubilee, an active transportation connection (stairs) along the east side of Pembina Highway with the AT path of the Transitway; and an active transportation ramp to Harrow Street;

(k) A new Transitway approximately 7.6 km in length connecting Pembina/Jubilee to Markham Road and to the University of Manitoba;

(l) A new Transitway Bridge over Pembina Highway near Jubilee;

(m) A new Transitway Underpass of CN Wye Tracks at the CN Portage Junction (includes two rail bridges; CN Rail Bridge over Transitway at the CN Wye (CN Letellier) and CN Rail Bridge over Transitway at the CN Wye (WC02 Spur)) and associated CN Detours and relocations in the CN Rivers and the CN Letellier subdivisions;

(n) Provide land drainage and any Related Infrastructure to accommodate the Transitway Underpass of the CN Wye Tracks at the CN Portage Junction;

(o) A new Transitway station north of Parker Avenue between Georgina Street and Beaumont Street (**Parker Station**);

(p) A new vehicle loop and short-term parking for passenger pick-up/drop-off at Parker Station;

(q) A transit-only roadway extension of Beaumont Street from Parker Avenue to the Transitway at Parker Station;

(r) Conversion of Parker Avenue to an urban cross-section between a point approximately 50 m West of Daniel Street to Planet Street and Planet Street from Parker Avenue to the first back lane south of Parker Avenue and any Related Infrastructure;

(s) Closure of Parker Avenue from Planet Street to Hurst Way;

(t) A two-lane easterly extension of Hurst Way, centred within the existing right-of-way with a rural cross-section, from a point 330 m east of Waverley Street to a point north of Parker Station;

(u) Closure of Hurst Way from Parker Avenue to 400 m east of Waverley Street on Hurst Way;

(v) A new north-south Roadway, Georgina Street, between the end of the easterly extension of Hurst Way and Parker Avenue that crosses the Transitway at an at-grade signalized intersection;

(w) A new Transitway station within the Manitoba Hydro Right-of-Way between Seel Avenue and Edderton Avenue (**McGillivray Station**);

(x) A new “Park and Ride” Facility at the McGillivray Station; including a Reconstruction of Seel Avenue between the Park and Ride lot and Fennell Street, and the construction of Edderton Avenue (also known as Willson Place) between the Park and Ride lot and Fennell Street;

(y) A new Transitway Overpass of McGillivray Boulevard;

(z) A new Transitway station within the Manitoba Hydro Right-of-Way north of Clarence Avenue (**Clarence Station**);

(aa) A new “Park and Ride” facility at the Clarence Station, including the Reconstruction of Waller Avenue between the Park and Ride lot and Irene Street;

(bb) An at-grade signalized intersection of the Transitway at Clarence Avenue;

(cc) An upgraded parking lot for 1260 Clarence Avenue (Buhler Industries);

(dd) A new Transitway station within the Manitoba Hydro Right-of-Way north of Chevrier Boulevard (**Chevrier Station**);

(ee) An at-grade signalized intersection of the Transitway at Chevrier Boulevard;

(ff) Reconstruction of French Street with the addition of a cul-du-sac, to an asphalt pavement. Construction of the side street and lane to the west of French Street between the cul-de-sac and Chevrier Boulevard to an asphalt pavement; Closure of Manahan Avenue from Hervo Street to French Street;

(gg) Widening of the north side of Chevrier Boulevard from the new Transitway to Pembina Highway to accommodate an on street AT path;

(hh) Widening of the south side of Chevrier Boulevard from the new Transitway to a point approximately 120 m west of Pembina Highway to accommodate an on street AT path;

(ii) A new sidewalk on the north side of Chevrier Boulevard from the new Transitway to Hudson Street;

(jj) A new AT path on the south side of Chevrier Boulevard from a point approximately 120 m west of Pembina Highway to Pembina Highway;

(kk) An at-grade signalized intersection of Chevrier Boulevard at the CN Letellier rail line complete with signals;

(ll) A new grade separation of the CN Letellier rail line and two CN spur lines (Letellier Grade Separation) and associated CN detours and relocations of the CN Letellier rail line and industrial spur lines;

(mm) Provide land drainage and any Related Infrastructure to accommodate the Letellier Grade Separation;

(nn) A new Transitway station within Manitoba Hydro Right-of-Way at the extension of Plaza Drive on the east side of the CN Letellier rail line (**Plaza Station**);

(oo) An at-grade crossing from Plaza Station to the west side of the CN tracks opposite Plaza Station;

(pp) Protection of the Lot 16 Drain, aqueduct, and feedermains for any temporary or permanent Transitway or rail crossings, as required by the City or CN;

(qq) A CN rail bridge over Bishop Grandin Boulevard (CN Letellier Rail Bridge over Bishop Grandin Boulevard), , including any rail relocations of the CN Letellier rail line;

(rr) Demolition of any portion of the existing CN rail bridge over Bishop Grandin Boulevard that is not utilized for the New Infrastructure;

(ss) Relocations of the CN Letellier rail line, as required for the New Infrastructure, from immediately north of Plaza Drive to south of Markham Road;

(tt) Provision of a Transitway Bridge over Bishop Grandin Boulevard, and associated retaining walls;

(uu) A new Transitway station at Chancellor Drive (**Chancellor Station**);

(vv) An at-grade signalized intersection of the Transitway at Chancellor Drive complete with signals for CN and the Transitway;

(ww) A transit-only, unsignalized, at-grade intersection of the Transitway at Southpark Drive;

(xx) A new Transitway station north of Markham Road (**Markham Station**);

(yy) An at-grade signalized intersection of the Transitway at Markham Road complete with signals for CN and the Transitway;

(zz) Miscellaneous parking lot improvements on the east side of the new Transitway between Bishop Grandin Boulevard and Markham Road;

(aaa) A Reconstruction of Southpark Drive between the CN Letellier subdivision and Pembina Highway (with a design that incorporates pedestrian, cycling, transit, and automobile functions);

(bbb) A noise attenuation wall along the City property line west of the City of Winnipeg feedermain easement from Bishop Grandin Boulevard to Markham Road;

(ccc) A new signalized intersection at Southpark Drive and Pembina Highway;

(ddd) Intersection improvements at Pembina Highway and Markham Road;

(eee) Intersection improvements at Pembina Highway and Southpark Drive;

(fff) A new Transitway through the U of M Southwood Lands to be designed in collaboration with the University of Manitoba;

(ggg) A new Transitway station (**IGF Station**) on the north side of Investors Group Field complete with a pedestrian ramp and overpass connection between Investors Group Field and the central platform of the station of a scale required to meet bus staging and passenger loading requirements following events at Investors Group Field. This station is to be designed in collaboration with Winnipeg Transit, the University of Manitoba and the Winnipeg Football Club;

(hhh) Geometric improvements and new traffic signals at the intersection of the Transitway at University Crescent;

(iii) A new University of Manitoba station (**University of Manitoba Station**) and any Related Infrastructure on Dafoe Road on the Fort Garry campus, to be designed in collaboration with Winnipeg Transit and the University of Manitoba;

(jjj) A new bus staging area and any Related Infrastructure at the east end of Dafoe Road (including the Reconstruction/construction of Dafoe Road between the bus staging area and Service 7 Street South), to be developed in collaboration with Winnipeg Transit and the University of Manitoba;

(kkk) A Reconstruction of Dafoe Road between Service 7 Street South and Gillson Street;

(lll) Upgrades of existing bus stops (westbound Dafoe at the School of Music, northbound University Crescent at Chancellor Matheson) on the University of Manitoba campus;

(mmm) New active transportation facilities along the total length of the Transitway, including connections to other parts of the active transportation network;

(nnn) Landscaping features and plantings at all Transitway station locations and at other locations along the corridor;

(ooo) Overhead Sign Structures, Roadway signage, Transitway signage, and station signage, as required;

(ppp) Relocation of Utility Infrastructure including above and below ground;

(qqq) Relocations as required of waterlines, hydrants, poles, etc. and other municipal infrastructure, to accommodate construction;

(rrr) Design and provision of LED lighting for Transitway, Roadways, AT paths, stations, Park and Rides, Kiss and Rides, parking lots, and within tunnels and beneath structures;

(sss) Relocation of the gravel road from Plaza Drive to the Bishop Grandin pumping station;

(ttt) Relocation or protection of existing municipal infrastructure running east-west through the Manitoba Hydro Right-of-Way, in the vicinity of the Letellier Grade Separation, originating from the Hopewell Lands area;

(uuu) Public Art; and

(vvv) New retaining wall along the north extent of the CN Rivers subdivision, west of the CN Rail Bridge over Pembina Highway.

C3. RESPONSIBILITY FOR DESIGN

C3.1 Except as specifically set out in Schedule 18 – Technical Requirements, the design of the Project shall generally align with the requirements set out in the *City of Winnipeg Southwest Transitway Stage 2 – Transitway Design Requirements*, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*, and *Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65)*.

C3.2 Project Co shall be responsible for other supplementary investigations as required to complete its designs in a professional and competent manner. This may include, but is not limited to; Permits, Licences and Approvals, environmental considerations, topographic survey, hydraulic and hydrologic investigations, additional geotechnical investigation, and other investigative surveys.

C3.3 All drawings and reports shall be sealed in accordance with the requirements of APEGM.

C3.4 Project Co shall submit their Detailed Design and all other items to review to the City Representative in accordance with the requirements set out in C5 of the Technical Requirements and Schedule 5 – Review Procedure prior to commencing construction.

C3.5 Project Co shall submit all designs at 90% to City of Winnipeg Underground Structures Branch for circulation. Following 10 Business Days of the City's receipt of the 90% Submittal, Proponents will be permitted to proceed with construction without a response from the City of Winnipeg Underground Structures Branch.

C4. GENERAL DESIGN REQUIREMENTS

C4.1 The performance requirements to be met in the design of all New Infrastructure include requirements in the areas of safety, functionality/serviceability, durability/maintainability, accessibility design, crime prevention through environmental design, and aesthetics as well as the minimum standards for these performance requirements are specified in the Technical Requirements and the appended documents. If a performance requirement is not specified in the Technical Requirements, the performance requirement shall be set to Good Industry Practice being met on Transitways, new Roadways, bridges and other structures of similar types in the City of Winnipeg.

C4.2 Design of any Roadway MEW shall be, at a minimum, in accordance with criteria cited herein and the City of Winnipeg Standard Construction Specifications for Surface Works and Underground Works listed below, which are available on the City's Material Management Website at http://www.winnipeg.ca/matmgt/Spec/Default.stm.

C4.3 CW1130, CW2030, CW2110, CW2125, CW2130, CW2140, CW2145, CW2160, CW3010, CW3110, CW3120, CW3130, CW3135, CW3170, CW3210, CW3230, CW3235, CW3240, CW3250, CW3310, CW3325, CW3326, CW3330, CW3335, CW3410, CW3450, CW3510, CW3520, CW3540, CW3550, CW3610, CW3615, CW3620, CW3650, and all Standard Details.

C4.4 Project Co shall develop construction specification and standard details for this Project as described in C5.1(c) and shall submit them to the City Representative in accordance with Schedule 5 – Review Procedure.

C4.5 All structural design for City structures related to grade separation and earth retaining structures, major drainage culverts larger than 1.5 m in diameter, and noise attenuation barriers shall be in accordance with CAN/CSA-S6-14, the Canadian Highway Bridge Design Code (CHBDC) to be structurally and functionally safe for the duration of the 75-year service life.

C4.6 All rail structures related to grade separation and connected earth retaining structures, as well as major drainage culverts under the railway shall be in accordance with *Manual for Railway Engineering*, American Railway Engineering and Maintenance-of-Way Association (AREMA), and *Appendix H – CN Guidelines* to be structurally and functionally safe in terms of accommodation of rail traffic, OMR Services for the duration of the 75-year service life. Where necessary, the CAN/CSA-S6-14, the CHBDC shall be used to supplement the AREMA Manual and *Appendix H – CN Guidelines*.

C4.7 All designs shall incorporate the appropriate selection of design concepts, design details, specifications, materials and construction methods and techniques.

C4.8 Design Codes and Manuals

C4.8.1 Project Co shall be responsible for ensuring all design completed throughout Design and Construction is in accordance with the latest edition (plus interims) of all design codes and manuals.

C4.8.2 The City shall provide notice of any revisions to City prepared design codes and manuals.

C4.8.3 Project Co shall be responsible for tracking revisions (and interims) of all other design codes, manuals and standards.

C4.8.4 Where a version change (and interims) for a design code, manual or standard occurs after the Technical Submission Deadline, Project Co shall provide notice to the City for the preparation of a Change Order as set out in Schedule 17 – Change Orders, should the change affect the design materially.

C4.8.5 All design codes and guidelines pertaining to accessibility, CPTED, universal design, etc. shall be adhered to.

C5. DESIGN DOCUMENTATION

C5.1 Project Co shall provide Detailed Design documents for the Design and Construction of the New Infrastructure. Detailed Design documents shall cover the full range of New Infrastructure required in the Project. Detailed Design documentation shall include, but not be limited to:

(a) Design reports for all aspects of the New Infrastructure that includes the decision process, criteria, assumptions, design notes, design codes, design loads, material information, material codes, and general information regarding the component and elements of the New Infrastructure used for each aspect of the design, construction staging plans, Permits, Licences and Approvals and special construction requirements;

(b) Detailed Design drawings prepared in accordance with formats and standards reflected in other similar City Roadway and bridge projects, including availability in electronic format; and

(c) Comprehensive construction specifications sufficiently detailed to describe the process or end result requirements.

C5.2 As a basis for this documentation, Project Co shall further develop and finalize the design reports, plans and specifications in Schedule 4 – Project Co's Management Systems and Plans, including, but not limited to:

(a) CN Rail Infrastructure Design Report;

(b) City Structures Design Report;

(c) Transitway and Roadway Infrastructure Design Report;

(d) Transitway Stations Design Report;

(e) Aesthetics and Landscaping Design Report; and

(f) Utility Infrastructure Report.

C5.3 It is understood that Project Co may be completing the Detailed Design of components of the New Infrastructure in stages and a complete Detailed Design document package for an entire component may not be available prior to commencing construction for elements of that component. For example, for a bridge structure (the component), piling design (an element of the component) may be complete, reviewed, and underway prior to the superstructure (an element of the component) design being completed.

C5.4 Project Co shall provide complete detailed Design Document packages to the City Representative in accordance with Schedule 5 – Review Procedure for each component or element of the component of the New Infrastructure. These design packages shall be submitted prior to starting construction of the components or elements designed in any specific package. For example, for a bridge structure, girder designs and drawings shall be provided prior to construction (fabrication) efforts are initiated.

C5.5 For clarity, each component much be submitted at 60%, 90%, and IFC in accordance with Schedule 5 – Review Procedure and shall follow the template outlined in Appendix XX – Design Submittal Requirements.

C5.6 The provision of the Detailed Design documents as set out in C5.1 and submitted in accordance with C5.5 does not relieve Project Co Parties of their responsibility to provide shop drawings or submittals required for construction activities. For example, the Detailed Design drawings for a bridge girder is not sufficient to construct the girders and fabricators will create their own internal set of fabrication shop drawings. These drawings should be submitted by Project Co Parties to the engineer of record as part of the QMS reviews

C6. TRANSITWAY AND ROADWAY DESIGN REQUIREMENTS

C6.1 Geometric Design

C6.1.1 The geometric design shall be undertaken in accordance with the latest edition of City of Winnipeg *Transportation Standards Manual*, *City of Winnipeg Busway Planning and Design Manual*, C4, and where noted, associated reference manuals or guidelines. Where specific design elements are not included in City of Winnipeg *Transportation Standards Manual*, the design shall be undertaken to conform to the *TAC Geometric Design Guide for Canadian Roads*.

C6.1.2 The geometric design shall utilize, as a minimum, the design criteria identified in the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report, the Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65), *Appendix DD – Pembina Highway Underpass: Geometric Design Criteria,* the lane widths outlined in *Appendix JJ – AT Path Functional Design – Pembina Highway at Jubilee Avenue,* and as detailed in C4, for the New Infrastructure. Where design criteria are not specified, desirable design criteria shall be utilized, except where minimum design criteria are acceptable to the City. These design minimums shall be considered in all geometric design decisions in order to facilitate any additions to the Design and Construction within the Project Term or later. The geometric design shall consider future costs, throwaway costs, user costs, safety, and identify an optimal geometric design within such constraints. Life cycle cost considerations shall be documented in the design report to support the geometric design decisions.

C6.1.3 Project Co is responsible for the Transitway and Roadway geometry, pavement design, and structural design such that the existing Transit fleet, including regular, articulated and electric buses are able to navigate the New Infrastructure at the design speeds. The current Transit bus fleet has the following characteristics:

(a) A nominal 12 m (40 feet) diesel bus with bike rack, mirrors and roof mounted Air Conditioning is 12.8 m L x 3 m W x 3.4 m H;

(b) A nominal 12 m (40 feet) electric bus with bike rack, mirrors and roof mounted Air Conditioning is 12.8 m L x 3 m W x 3.3 m H; and

(c) A nominal 19 m (60 feet) diesel articulated bus w bike rack, mirrors and roof mounted A/C is 19.4 m L x 3 m W x 3.4 m H.

C6.1.4 Typical Transit bus vehicle turning radii, type and dimensions have been provided as Project Background Information. The information is provided as-is and it is the responsibility of Project Co to confirm the turning radii.

C6.1.5 Curves along the Transitway may be designed to a maximum superelevation of 4% in order to maximize the design speed.

C6.1.6 Intersection improvements at Pembina Highway and Markham Road shall include the following:

(a) Bus turning movements will be accommodated including revisions to signal timings for eastbound right turning movements and northbound left turning movements;

(b) Design and construction of an extension of the northbound Pembina Highway left turn lane to westbound Markham Road by 35 m; and

(c) Transit signal priority for northbound left turning movements.

C6.1.7 The Pembina Highway Underpass horizontal geometry, including stopping sight distance, shall be designed to preliminary design geometry or better.

C6.1.8 The Design and Construction of the Zone of Intrusion shall comply with American Association of State Highway and Transportation Officials (AASHTO) design guidelines.

C6.1.9 The number of lanes on Willson Place from Fennell Street to the McGillivray Station Park and Ride shall be two lanes, one in each direction.

C6.1.10 The parking lane taper in the westbound Southpark Drive in front of 75 Southpark shall be extended to the projected west edge of the building to maximize the street parking in front of the building.

C6.1.11 The Roadway alignment within the U of M Southwood Lands will follow Appendix VV – Realigned Roadway through Southwood Lands.

C6.1.12 A super-elevation of 2% may be used on the design of the curve in the Southwood Lands to maximize the design speed.

C6.1.13 Stations along the Transitway may be designed with a crown or reverse crown superelevation, to a maximum of -2% (fall to center) or +2% (fall to edge). Catchbasins and drainage inlets shall be located away from the loading areas of passenger platforms when designing with a fall to edge superelevation.

C6.1.14 Design and Construction of the radius from southbound University Crescent to westbound IGF Station shall accommodate the turning movement of a transit bus.

C6.2 Intersections

C6.2.1 The design of at-grade intersections shall be in accordance with the latest revision of the City of Winnipeg *Transportation Standards Manual*. Where specific design elements are not included in City of Winnipeg *Transportation Standards Manual*, the design shall be undertaken to conform to the TAC *Geometric Design Guide for Canadian Roads*.

C6.2.2 Grades on the Transitway approaching and extending through an intersection shall have a longitudinal grade less than 3% for a minimum length of 40 m on the Transitway prior to reaching the near side gutter of the cross-street.

C6.3 Soils

C6.3.1 The grading design shall take into consideration the soil types encountered. Existing geotechnical information is available as described in A3. Project Co shall ensure there is sufficient detail to allow for the identification of all soil issues.

C6.3.2 Project Co may undertake additional geotechnical investigation during Design and Construction following Commercial Close if they so choose, at its sole cost and expense.

C6.3.3 Project Co shall prepare detailed geotechnical information for inclusion in each of the reports identified in C5 for the purpose of documenting soil conditions and the engineering recommendations for all geotechnical issues for each major work item of the Project.

C6.3.4 The berm to the South Southeast of the tie-in point between the Stage 1 Infrastructure and the New Infrastructure has the potential to contain contaminated material. This material, to a depth of 1 m below the original ground level prior to the construction of the berm, may be excavated and relocated within the Stage 1 Lands. Should Project Co require a portion of this material to be removed from the site, Permits, Licences and Approvals shall first be obtained from Manitoba Conservation and Water Stewardship.

C6.3.5 Additional Test Holes Preceding Financial Close

(a) Project Co shall assume responsibility for all test hole locations and any associated standpipes, casings, and piezometers completed as part of the geotechnical testing undertaken prior to Financial Close.

(b) Project Co may undertake further monitoring of the test holes if they so choose, at its sole cost and expense.

(c) Project Co shall abandon all test holes during Design and Construction. Abandoning test holes shall consist of filling with bentonite chips and removal of all standpipes, casings, and piezometers to a minimum of 1.0 m below final finished grade.

C6.4 Drainage

C6.4.1 Project Co shall develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, a drainage plan. The drainage plan for specific components of the Project or phases of the Project shall be reviewed in accordance with Schedule 5 – Review Procedure prior to commencing Design and Construction or OMR Services of that specific component of the Project.

C6.4.2 The primary objectives for developing the drainage plan for the Project are for the control and management of drainage throughout the Lands to ensure Design and Construction of the New Infrastructure does not negatively impact the existing drainage of the Lands. Refer to this specification for the requirements of the drainage plan during Design and Construction.

C6.4.3 The drainage design shall prevent damage to Transitway and road right-of-ways, be sized and maintained to prevent flooding in neighbouring lands, and prevent delays to Transitway and Roadway users due to flooding or drainage problems. The drainage design is to take into consideration and address the drainage requirements within the Project and can in no way adversely affect drainage within any adjacent property or existing drainage in the Lands.

C6.4.4 The drainage design within the Manitoba Hydro Right-of-Way shall be designed to address the drainage of the Transitway and the road right-of-way including any drainage from the surrounding lands within the Manitoba Hydro Right-of-Way that currently drains towards the new Transitway alignment. The entire Manitoba Hydro Right-of-Way shall not be regraded to provide positive drainage. The drainage system for the Transitway shall not be built to prevent positive drainage from the Manitoba Hydro Right-of-Way.

C6.4.5 The drainage design shall not alter the existing drainage bounded by the existing Parker Avenue, the CN Right-of-Way and the existing north-south leg of Hurst Way projected north to the CN Right-of-Way.

C6.4.6 The drainage design needs to take into consideration that no runoff from the land north of the Hydro Right-of-Way along the extension of Hurst Way from Parker Avenue to Georgina Street can flow into the Transitway right-of-way or the Parker Pond. To accommodate this, the drainage plan should consider the AT path on the north side of Hurst Way as a berm continuing towards the Parker pond, to the east, after the AT path continues south to connect to Parker Station. The berm shall then be extended to the CN Right-of-Way on the west side of the pond with any berm construction being located within City owned property.

C6.4.7 Project Co shall be responsible for obtaining all necessary Permits, Licences and Approvals from, but not limited to, Manitoba Conservation and Water Stewardship, Department of Fisheries and Oceans Canada, City of Winnipeg River and Streams Waterway, and the City of Winnipeg Water and Waste Department, and others as applicable.

C6.4.8 The drainage design shall include items for erosion control for the in-situ conditions of the drainage Design and Construction.

C6.4.9 The drainage design within the Southwood Lands shall be designed to address the drainage of the Transitway and any drainage that currently drains towards the new Transitway alignment. The Southwood Lands shall not be regraded to provide positive drainage. The drainage system for the Transitway shall not be built to prevent positive drainage from within the Southwood Lands.

C6.5 Road Side Safety Devices

C6.5.1 The use of barriers shall be limited to those areas where it is necessary to protect the Infrastructure User (lawfully or unlawfully using the New Infrastructure) from roadside hazards and to separate areas where the Transitway runs parallel to CN. All grade line design shall be such as to minimize the need for barriers.

C6.5.2 Project Co shall utilize the appropriate barrier configuration for providing protection for roadside hazards based on safety considerations. For drainage obstructions, Project Co shall undertake the design to minimize the need for protection. In any special circumstance where protection is required, Project Co shall protect the Infrastructure User from the hazard using a barrier that has passed all required tests for NCHRP Report 350, Test Level 3, unless otherwise specified elsewhere in the Technical Requirements.

C6.5.3 Project Co shall use barrier end treatments that have passed all required tests for NCHRP Report 350, Test Level 3.

C6.5.4 Where barriers are required and cannot be avoided by altering design characteristics of the Transitway, concrete F-shape, concrete single slope, or a Midwest Guardrail System with crash tested end treatments shall be used.

C6.5.5 Except for where the AT path is immediately adjacent to the Transitway, Project Co shall protect the AT path from a Roadway or Transitway with a clear zone rather than a barrier.

C6.6 Pavement Structure

C6.6.1 Project Co shall design the pavement structures in accordance with recognized design procedures on the basis of actual soil parameters for the Transitway and Roadway subgrade. The pavement structures for all Transitway and Roadways within the Project shall be designed with no reduction of or restrictions to allowable legal load(s), during spring time thawing conditions or at any other time. For pavement designs such as final-stage paving and rehabilitation, the method shall utilize back-calculated moduli values that Project Co shall determine based on non-destructive testing.

C6.6.2 Materials for the Transitway and Roadways heavily utilized by buses or heavy service vehicles shall be Portland Cement Concrete (PCC) pavement. More specifically, the following New Infrastructure shall be PCC pavement:

(a) Transitway;

(b) Beaumont Street;

(c) Edderton Avenue west of the east gutter line of Fennell Street;

(d) Seel Avenue;

(e) Waller Avenue;

(f) Any work on Chevrier Boulevard;

(g) Any work on Markham Road;

(h) Southpark Drive;

(i) University Crescent;

(j) Dafoe Road between Sifton Road and bus staging area at east end of Dafoe Road; and

(k) Bus Staging Area at east end of Dafoe Road.

C6.6.3 Asphalt pavement will be allowed for all other pavements including Pembina Underpass, Park and Ride facilities, parking lots, the AT path and shoulders of rural cross-sections in accordance with the pavement design set out by Project Co. Where an asphalt pavement is designed on a Roadway where a bus stop exists, the slab at the bus stop shall be concrete for the full length of the bus stop.

C6.6.4 Asphalt pavement shall be permitted for up to 100 m of approaches to bridges structures on the Transitway to allow for settlement correction. Where the use of a structural retaining wall would yield approach embankments longer than 100 m, extending the asphalt pavement to the end of the structural retaining wall will be permitted.

C6.6.5 It is anticipated that the Transitway will carry approximately 400 buses per day, per direction, during regular bus operations at Substantial Completion, and 550 buses per day, per direction, during regular bus operations at the conclusion of the 30-year OMR period. Should the average number of buses in any year exceed an average of 550 buses per day, per direction, then Project Co will be entitled to a Change Order subject to and in accordance with Schedule 17 – Change Order.

C6.6.6 All travel lanes and full shoulder widths shall be paved. Shoulder surface materials do not have to be the same as the adjacent Transitway or Roadway surface materials.

C6.6.7 The potential for future widening as outlined in C15 shall be addressed in the design such that increased cost does not result at the time of any future widening. The subgrade widening at tie-ins to Existing Infrastructure shall be constructed to avoid disruption of

drainage along the subgrade surface and to protect the integrity of the existing pavement structure. Pavement structure variation for New Infrastructure shall be introduced beyond the tie-in point to preserve subgrade drainage and structural integrity of Existing Infrastructure.

C6.6.8 The pavement structure design shall account for future widening as stipulated in C15. The design shall identify how the future expansion will be accomplished in a cost effective manner. The pavement design shall provide for the shoulder sub-base thickness on the side(s) proposed for future widening to provide structural capacity for use as a portion of the future lane(s).

C6.6.9 Notwithstanding Figure 47 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*, Project Co shall provide PCC pavement through any tunnel structure.

C6.6.10 Pavement Design

(a) Project Co shall prepare a pavement design for all different pavement types within the Project and subsequent preservation and rehabilitation strategies that shall include, as a minimum:

(i) Site plan showing the limits covered by each pavement design;

(ii) Typical cross-section drawings for the recommended pavement design strategy;

(iii) All pertinent design inputs such as traffic, soils characteristics, characteristics of the proposed construction materials, environmental inputs to the design and for rehabilitation designs, the existing pavement structure;

(iv) Discussion of the inputs used to arrive at design recommendations and the rationale used in selecting the recommended design strategy;

(v) For rehabilitation designs, graphical presentation of calculated moduli, overlay needs, and existing cross-sections.

C6.6.11 Design Vehicles

(a) The Transitway and Roadways design vehicle shall be a New Flyer Excelsior model bus. The City of Winnipeg has both 12.8 m (40') and 19.4 m (60') diesel buses of this model. In addition, consideration shall be given to the specifications of the new electric buses that the City of Winnipeg is currently testing. The specifications of these buses have been provided as Project Background Information. When completing the pavement design, the bus with the highest loading shall be considered. In addition, a full passenger loading shall be taken into account.

(b) The following weights should be considered:

(i) Regular diesel bus weighs 13,350 kg (29,431 lbs) in total (9,130 kg/20,128 lbs on the rear axle and 4,110 kg/9,060 lbs on the front);

(ii) The 60' diesel articulated bus weighs 10,319 kg/22,751 lbs on the rear axle, 9,469 kg/20, 877 lbs on the middle axle and 4,389 kg/9,978 lbs on the front axle;

(iii) The 60' electric hybrid bus weighs 11,330 kg/24, 980 lbs on the rear axle, 6,241 kg/13,760 lbs on the middle axle and 5,080 kg/11,200 lbs on the front axle;

(iv) The 60' electric articulated bus weighs 29,270 kg (64,527 lbs) in total (12,670 kg/27,932 lbs on the rear axle 9,850 kg/21,717 lbs on the middle axle, and 6,748 kg/14, 877 lbs on the front axle);

(v) The electric bus weighs 15,340 kg (33,818 lbs) in total (10,200 kg/22,487 lbs on the rear axle and 5,120 kg/11,287 lbs on front); and

(vi) The passenger loading for a bus should also be considered. The maximum capacity for a 12.8 m/40' bus with full ridership is 70 passengers averaging 175 lbs each. The capacity for a 19.4 m/60' bus is 105 passengers averaging 175 lbs each for the diesel and electric hybrid articulated bus. The capacity for a 19.4 m/60' bus is 125 passengers averaging 175 lbs each for the electric articulated bus.

(c) The weights in i) and ii) above are with a driver and a full diesel fuel tank. (454.6 L/100 Cdn gallons for the diesel and 181.8 L/40 Cdn gallons for the electric).

C6.6.12 Reconstruction of pavement surface types and thicknesses shall be like for like on Roadways where minor grade adjustments and/or minimal work is required to match with the Transitway in locations such as cross streets or tie-in intersections. This shall be at intersecting locations with the Transitway such as, but not limited to, Clarence Avenue, Chevrier Boulevard, Chancellor Drive, Markham Road, Pembina Highway intersection with Southpark Drive, and University Crescent, but not for the roadway through the Transitway. In addition, if these locations are MEW locations as listed in E1.9.4, the pavement structure below the pavement surface type and thickness shall not be like for like; rather they shall meet the following requirements:

(a) Pavement surface type and thickness – like for like;

(b) 75 mm of Base Course material (see C4);

(c) 150 mm of 50 mm Sub-base material (see C4);

(d) 450 mm of 150 mm Sub-base material (see C4); and,

(e) Geotextile Fabric (see C4).

C6.6.13 It is anticipated that Dafoe Road will carry 700 buses per day, per direction, during regular bus operations at Substantial Completion.

C6.6.14 In addition to Transit buses traveling on the Transitway at the IGF Station there may be periodic access from other users as follows:

(a) Semi-trucks as outlined in C9.4.1(h) will potentially access the Transitway to access the trailer parking area; and

(b) Service vehicles including a skidsteer or loader to access the storage bays below the platform of IGF Stadium as outlined in C9.4.1(i).

C6.6.15 It is anticipated that Hurst Way will carry 100 buses per day, during regular bus operations for anticipated bus routes as a long-term Winnipeg Transit plan.

C6.7 Materials

C6.7.1 Project Co shall select the materials to be used for Design and Construction and OMR Services to meet the Technical Requirements. Where materials, such as culverts, have an expected life of greater than 30-years, the selection of the appropriate materials shall be based on a minimum of a 50-year life for the material.

C6.7.2 All construction materials shall be new materials.

C6.7.3 Topsoil

(a) Topsoil shall consist of a natural, friable surface soil of organic character, suitable for agricultural purposes.

C6.7.4 Aggregates

(a) Aggregates for PCC shall be suitable for use in concrete, shall exhibit suitable long-term performance characteristics and shall conform to the specifications outlined for use by Project Co. Aggregates for use in concrete pavements or appurtenances shall exhibit suitable resistance to alkali-aggregate reactivity.

(b) Aggregates for use in asphalt concrete shall conform to the specifications outlined by Project Co and be selected to provide suitable long-term performance.

(c) Recycled Concrete Base Course and Sub-base Material will not be permitted on this Project.

C6.7.5 Portland Cement Concrete

(a) PCC for use in pavements, curbs, gutters, sidewalks, barriers, or other appurtenances shall consist of a mixture of PCC, supplementary cementing materials, fine aggregate, coarse aggregate, water and admixtures where required, in proportions to meet the requirements of the design.

(b) PCC designed for any application that will be in contact with winter maintenance materials shall consist of materials shown to provide adequate resistance to scaling and other freeze thaw damage.

(c) The PCC mix design used within the Project shall be developed by Project Co. CW 3310 section 5.3 and section 6 of the City of Winnipeg Standard Construction Specifications may be used as a guide.

C6.7.6 Asphaltic Concrete

(a) The asphaltic concrete mix design used within the Project shall be developed by Project Co. CW 3410 section 5.4 and section 6 of the City of Winnipeg Standard Construction Specifications may be used as a guide.

C6.7.7 Reinforced Concrete Pipe

(a) Reinforced concrete pipe for storm sewers or culvert applications shall conform to the material and fabrication requirements of CSA Standard A257.2. Concrete manhole risers and tops shall conform to all the material and fabrication requirements of CSA Standard A257.4.

(b) Joints for circular concrete and culvert pipe using flexible rubber-type gaskets shall conform to all the material and fabrication requirements of CSA Standard A257.3.

(c) All pipes larger than 1.5 m in diameter shall be concrete. A reinforced concrete pipe larger than 1.5 m in diameter shall be considered a bridge structure when used for ditch or stream drainage and shall be designed in accordance with CAN/CSA S6-14, the CHBDC with a design life of 75 years.

(d) All products shall at a minimum conform to the Approved Products section in the latest revision of the City of Winnipeg Standard Construction Specifications.

C6.7.8 Polyvinyl Chloride Pipe

(a) Polyvinyl chloride (“PVC”) pipe shall be made of virgin PVC plastic as defined in CSA Standard C22.2 No. 211.1. Gaskets for PVC pipe shall conform to the requirements of CSA Standard B182.2. All products shall at a minimum conform to the Approved Products section in the latest revision of the City of Winnipeg Standard Construction Specifications.

C6.7.9 Smooth Walled Steel Pipes

(a) All products shall at a minimum conform to the Approved Products section in the latest revision of the City of Winnipeg Standard Construction Specifications.

C6.7.10 Corrugated Metal Pipe And Pipe Arches

(a) Corrugated metal pipe and pipe arches (less than 1.5 m diameter) shall be selected to ensure a minimum design life of 50 years for the soil conditions in which they are to be installed. Any pipe 1.5 m or larger is considered a bridge structure when used for ditch or stream drainage and shall be concrete.

(b) Corrugated steel pipe (“CSP”) and pipe arches including couplers and appurtenances shall be galvanized, polymer coated, or aluminum coated in accordance with the latest edition of the City of Winnipeg Standard Construction Specifications, at a minimum.

(c) Corrugated aluminum pipe (“CAP”) and pipe arches including couplers and appurtenances shall at a minimum be manufactured to meet the requirements of the latest revision of the City of Winnipeg Standard Construction Specifications and shall be marked with the manufacturer’s name or trade mark and the date of manufacture.

(d) During installation, any damaged coating shall at a minimum be reinstated with the appropriate material in accordance with the latest revision of the City of Winnipeg Standard Construction Specifications.

(e) All products shall at a minimum conform to the Approved Products section in the latest revision of the City of Winnipeg Standard Construction Specifications.

(f) Installation shall follow the City’s safety requirements for the grading of LDS pipes.

C6.7.11 Curbs, Gutters, Medians, Traffic Islands, Sidewalks and Other Appurtenances

(a) All curbs, gutters, raised medians, traffic islands, sidewalks and other appurtenances shall be constructed with PCC. Curb heights within stations shall be a 250 mm in height as described in the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report.

C6.7.12 Construction of Tinted Concrete

(a) This specification covers the construction of “red” tinted concrete pavement, intended to delineate Transit-only pavements at various locations in this Project. The tinted concrete is finished at-grade and is to include the width of the travel lane. Care shall be taken with consistency in water/cement ratio and finishing as the colour can be affected load to load.

(b) Red tinted concrete is to be used at all at-grade intersections where unauthorized vehicles could illegally enter Transit-only pavements. These locations include, but are not limited to:

(i) The section of Beaumont Street between Parker Avenue and a point approximately 15 m north of Parker Avenue;

(ii) The section of the Transitway between Georgina Street and a point approximately 15 m east of Georgina Street;

(iii) The section of the Transitway between Georgina Street and a point approximately 15 m west of Georgina Street;

(iv) The section of Seel Avenue between the eastern-most vehicular entrance to the McGillivary Park and Ride lot and the Transitway;

(v) The section of the Transitway between Clarence Avenue and a point approximately 15 m north of Clarence Avenue;

(vi) The section of the Transitway between Clarence Avenue and a point approximately 15 m south of Clarence Avenue;

(vii) The section of the Transitway between Chevrier Boulevard and a point approximately 15 m north of Chevrier Boulevard;

(viii) The section of the Transitway between Chevrier Boulevard and a point approximately 15 m south of Chevrier Boulevard Avenue;

(ix) The section of the Transitway between Chancellor Drive and a point approximately 15 m north of Chancellor Drive;

(x) The section of the Transitway between Chancellor Drive and a point approximately 15 m south of Chancellor Drive;

(xi) The section of the Transitway between Markham Road and a point approximately 15 m north of Markham Road;

(xii) The approach to the Transitway at the west end of Southpark Drive;

(xiii) The section of the Transitway between Markham Road (in the Southwood Lands) and a point approximately 15 m north of Markham Road;

(xiv) The section of the Transitway between Markham Road (in the Southwood Lands) and a point approximately 15 m south of Markham Road;

(xv) The approach to IGF Station between University Crescent and a point approximately 15 m west of University Crescent;

(xvi) The section of Dafoe Road between Gillson Street and a point approximately 15 m east of Gillson Street;

(xvii) The section of Dafoe Road between Service 7 St S and a point approximately 15 m east of Service 7 St S; and

(xviii) The approach to the Dafoe Bus Staging area between Freedman Crescent and a point approximately 15 m north of Freedman Crescent.

(c) Project Co shall base the tinted concrete mix on the PCC mix design prepared by Project Co.

(d) To ensure consistency around the City of Winnipeg, "Red" coloured metal oxide pigment used to permanently colour the ready-mix concrete with the approved Product List as follows:

(i) Lafarge Red (Premium) supplied through L.M. Scofield Company; and

(ii) SG160-2 Sunrise Red supplied through L.M. Scofield Company.

(e) Surficial colouring will not be accepted.

(f) Superplasticizers shall conform to the requirements of CSA CAN3-A266.5 and CAN3-A266.6, but shall be compatible with the air-entraining agent. The agent shall be free of chlorides and shall not affect the air-entraining agent's ability to produce a satisfactory air void system.

(g) Curing Compound shall be clear (no pigment), and water based conforming to the requirements of ASTM C309.

C6.7.13 Communication Tie Line Conduit

(a) Project Co shall supply polyethylene duct as defined in ASTM D 1248 and clauses 5.1.1 and 5.1.2 of the CSA Standard B137.1 – M1983 for PE compound used and dimensional requirements respectively. In addition, 2" (in) pipe shall be 52.0 to 52.7 mm inside diameter (ID) and have a wall thickness of 5.44 (-0 +0.54) mm.

(b) Precast Service Boxes shall be in accordance with City of Winnipeg Standard Detail SD-322, with the lids manufactures with the label "TRANSIT" on the top.

(c) Construction methods shall be to industry standard specifications for the installation of conduit for utilities including depth of bury.

(d) Conduit shall run from the north Project limit of the Construction Period Lands tying into the southernmost connection from the Stage 1 Infrastructure all the way to the southernmost point of Stage 2 at the Markham Station on the south and east sides of the Transitway. In addition, conduit shall also run from the Transitway to the IGF Station via Southpark Drive and the Transitway within the U of M Southwood Lands on the south and west sides of the Transitway.

(e) The conduit shall surface in service boxes every 100 – 120 m intervals, in reasonable locations, with one box at either end of each station.

(f) There shall be two conduits as described above, placed side by side for the entire length of the Transitway.

C6.8 Any separation of the Transitway lanes with a barrier, fencing, median, or structure will not be permitted, with the exception of the station median fencing identified in C9.13.1(a).

C6.9 The maximum slope on grade separated structures shall be 4.5%, unless there are design constraints that do not allow a 4.5% slope then a maximum of 5.0% may be used.

C6.10 Any New infrastructure where a Reconstruction is taking place, similar to Southpark Drive and French Street, a Reconstruction of the private approaches in concrete, from the edge of the street to the property line shall be completed as part of the Reconstruction.

C7. CITY STRUCTURES DESIGN REQUIREMENTS

C7.1 Reference to City structures in C7 does not include railway structures or portions of the New Infrastructure subjected to railway loading. All Rail Work shall be designed in accordance with C22.7.

C7.2 Structure Identification (Number)

C7.2.1 All Design and Construction for the City structures shall make reference to the City's identification method for infrastructure.

C7.2.2 The structure numbers for the New Infrastructure will be provided by the City at a later date.

C7.2.3 The structure numbers for the Existing Infrastructure shall also be referenced as necessary and are as follows:

(a) U201 – Pembina Highway Underpass (Mile 2.65 CN Rivers);

(b) U230 – Route 165 Underpass (Mile 2.46 CN Letellier); and

(c) B124 – Jubilee Overpass (Pembina Highway).

C7.3 Design

C7.3.1 The major City structures are as follows.

(a) AT Path Connection at Pembina;

(b) Transitway Bridge over Pembina Highway;

(c) Transitway Overpass of McGillivray Boulevard;

(d) Transitway Bridge over Bishop Grandin Boulevard; and

(e) Pedestrian overpass structure and ramp to Investors Group Field.

C7.3.2 General

(a) The requirements to be met in the design of all City structures are specified in the Technical Requirements and address the areas of design, safety, functionality/serviceability, durability/maintainability, and aesthetics. If a requirement is not specified in the Technical Requirements, the requirement shall be set to Good Industry Practice being met on new structures of similar type in the City, subject to CN approval.

(b) City structures shall be designed to be structurally and operationally safe in terms of accommodation of traffic, operations, and inspection and OMR Services for the entire duration of their service life. All designs shall incorporate the appropriate selection of design concepts and code provisions, design details, specifications, materials, and construction methods and techniques.

(c) Where any City structure varies from what is shown in the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report, Project Co shall be responsible for satisfying the following requirements:

(i) The structures are contained within the Construction Period Lands;

(ii) Any accommodation of Existing Infrastructure due to the impact of the Design and Construction by Project Co through, but not limited to, removal, relocation, or protection shall be addressed; and

(iii) Project Co shall develop a stakeholder management plan that addresses the issues that may be raised by stakeholders living adjacent to that City structure, including, but not limited to, increased noise levels, property value concerns, aesthetics, and safety. This plan shall be included in Project Co's public engagement strategy in accordance with Schedule 24 – Communications Plan.

(d) Notwithstanding C7.3.2(c), an overpass of the CN Portage Junction will not be permitted.

C7.3.3 Responsibility for Design

(a) Project Co shall be responsible for completing the structural, hydraulic, geotechnical, foundation, and slope stability design for City structures, including grade separation structures, earth retaining structures, and culverts, as detailed in this section and to produce engineered drawings. Project Co is also responsible for all necessary investigations and the design of all elements of the New Infrastructure including, but not limited to; all additional geotechnical investigations, hydro-geological and hydro-technical design, environmental considerations and permits, topographic surveys, in-stream watercourse surveys, Permits, Licences and Approvals, and other field investigations and technical analysis required to complete the designs in a professional and competent manner while following Good Industry Practice.

(b) All drawings and reports shall be sealed in accordance with the requirements of APEGM.

C7.3.4 Design Criteria

(a) All structural design related to City structures, including grade separation structures, earth retaining structures, and culverts, shall be in accordance with CAN/CSA-S6-14, the Canadian Highway Bridge Design Code (CHBDC), unless noted otherwise, to be structurally and functionally safe in terms of accommodation of traffic and OMR Services for the duration of the 75-year service life.

(b) Where specifically noted otherwise in the Technical Requirements, key components may be subject to design utilizing alternate design codes. Structural design shall be in accordance with those design codes where applicable.

(c) The following design criteria and guidelines shall be incorporated for the design of City structures:

(i) CSA S6 Canadian Highway Bridge Design Code (latest edition);

(ii) Truck Loading CL-625;

(iii) Bus loading in accordance with C6.6.11;

(iv) Future LRT design loading in accordance with *Busway Planning and Design Manual*, City of Winnipeg Transit Department, September 2004;

(v) Bus Rapid Transit Runningways - Recommended Practice, American Public Transit Association (APTA) Standards Development Program;

(vi) *Geometric Design Manual*, Transportation Association of Canada (TAC);

(vii) Transportation Standards Manual, City of Winnipeg; and

(viii) *A Policy on Geometric Design of Highways and Streets*, American Association of State Highway and Transportation Officials (AASHTO).

(ix) NFPA 502: Standard for Road Tunnels, Bridges, and Other Limited Access Highways.

(d) All Transitway bridges shall be designed to be full continuous and incorporate integral or semi-integral abutments. Expansion shall be accommodated with roadway expansion joints beyond the end of the structures.

(e) The level of pedestrian use for all AT paths and structures shall be designed to “frequent pedestrian use” in accordance with the CHBDC.

C7.3.5 Roadway and Transitway alignment shall not be placed on two different structural elements such as a roof structure and a headwall, to eliminate differential movement.

C7.4 Vertical and Horizontal Clearance Requirements

C7.4.1 The minimum vertical clearance for all City structures shall be 5.3 m, unless noted otherwise.

C7.4.2 The Transitway Bridge over Pembina Highway shall have a minimum vertical clearance of 5.0 m.

C7.4.3 The pedestrian overpass structure and ramp to Investors Group Field shall have a minimum vertical clearance for buses to pass below it, of 4.2 m.

C7.4.4 Any pedestrian underpasses shall have a minimum vertical clearance of 3.0 m.

C7.4.5 The minimum horizontal clear distance between any bridge structures shall be 2.5 m.

C7.5 Superstructure Design

C7.5.1 As part of the provision of Detailed Design documentation outlined in C5, Project Co shall provide relevant drawings and design calculations to show how conversion to LRT operations will be completed.

(a) Notwithstanding Drawing F-8 of the Busway Planning and Design Manual, top longitudinal reinforcing will be permitted in areas for a future "continuous concrete pad". The requirement to exclude prestressing ducts in these locations is maintained.

C7.5.2 Bridge Deck

(a) Stay in place formwork shall not be permitted.

(b) Partial or full depth precast panels will be permitted.

(c) For slab on girder bridges, the minimum thickness of the deck slab shall be 225 mm with a minimum haunch height of 25 mm.

(d) For multi-beam girder bridges, the minimum thickness of the deck shall be 125 mm.

(e) Deck Joints

(i) The deck shall be designed to be continuous for live load over the piers for all bridge structures.

(ii) No expansion joints will be permitted on the bridge deck unless otherwise approved by the City.

(iii) Notwithstanding C7.5.2(e)(ii), all expansion joints off the bridge used for grade beams, roof slabs, or approach slabs for the semi-integral or integral abutment systems shall utilize box type seals as shown in *Appendix E – Standard Construction Details*.

(f) Deck Drainage

(i) The deck shall not drain on to the bridge sidewalk or cause ponding on the sidewalk. There should be positive drainage from the sidewalk and deck towards the deck side face of the separation barrier. The sidewalk shall have a minimum slope of 1% towards the barrier and shall be a minimum of 150 mm above the deck surface at deck side face of the separation barrier.

(ii) A minimum crossfall of 2% shall be provided for the approach and bridge deck, except where the Transitway is superelevated.

(iii) Vertically curved bridges, with a minimum slope of 0.35% except at the peak of the vertical curve, are the preferred system for deck drainage.

(iv) Bridges with longitudinally single sloped decks are permitted and shall have a minimum slope of 0.35% with a preferred slope of 0.6%.

(g) Waterproofing Membrane for Asphaltic Wearing Surfaces

(i) Waterproofing membranes for bridge decks shall consist of hot applied rubberized asphalt waterproofing system and shall be installed on all bridge decks that will be receiving an asphaltic wearing surface.

(ii) The bridge deck surface shall be allowed to cure for a minimum of 28 days prior to the application of the hot applied rubberized asphalt waterproofing system. After the 28 day drying period, an additional drying time of two days shall be provided after a rainfall event.

(h) Approach slabs shall be provided at the end of the bridges and shall extend a minimum of 5 m from the end of the bridge structure. The approach slabs shall provide a smooth transition from the approach to the wearing surface of the bridge deck.

C7.5.3 Bridge Curbs and Barriers

(a) Project Co shall design and construct bridge barriers that have passed all required tests for NCHRP Report 350, Test Level 4.

(b) All bridge curbs and barriers shall have control joints spaced no greater than 3 m. Reinforcing should be discontinuous over the joint. All joints should be sealed with a durable joint system.

(c) The barrier concrete joint details provided in Appendix E – Standard Construction Details shall be the minimum requirements for barrier concrete joints.

(d) For design purposes, each barrier shall be treated as an end panel.

(e) Project Co will be permitted to eliminate the control joint shown in Appendix E – Standard Construction Details in favour of continuous sections with a non-formed barrier control joint detail that eliminates the smooth dowels. Reinforcing should remain discontinuous over the joints, a barrier length of 3 m should be maintained, and crack initiators should be provided at the non-formed barrier control joint.

(f) Barrier Type

(i) Single slope barriers shall be used, with a minimum height of 1070 mm. The bottom width of the barrier shall be 500 mm and the top width of the barrier shall be 300 mm. An additional 50 mm of barrier height has been provided to facilitate future asphalt resurfacing.

(ii) At a minimum, each barrier shall have stirrups and dowels spaced at 100 mm for four spaces (total of five bars) on each side of a formed or unformed barrier control joint. Exterior to this condition, the reinforcing shall be spaced at a maximum of 300 mm.

C7.5.4 Bridge Pedestrian Handrails

(a) Project Co is responsible to meet the requirements of the National Building Code of Canada with respect to handrails and guards.

(b) Bridge handrails shall be stainless steel or aluminum.

(c) Bridge handrails shall accommodate thermal movement of the bridge.

(d) The City's standard handrail system would be similar to that constructed for the Fort Garry Twin Bridges Rehabilitation. Reference details have been provided as Project Background Information.

(e) Notwithstanding C7.5.4(d), Project Co shall be responsible for ensuring all handrails are of sufficient height to protect the safety of the Infrastructure User, specifically cyclists who are expected to have a higher center of gravity. Project Co shall assume that all structures with AT paths will have cyclist traffic.

(f) Bridge handrails shall extend along the entire length of the bridge and any approach MSE walls.

(g) Handrails are required for embankments where a concrete curb is not provided and the slopes beyond are steeper than 4H:1V. Fencing, as a method of providing safe passage of pedestrians and cyclists down from the raised elevation of an embankment or grade separation structure, will not be permitted.

(h) Termination points of handrails shall be designed for the safety of the Infrastructure Users. Where possible, handrails shall be flared and guiding curbs shall be provided to route the Infrastructure User away from the termination point.

(i) Bridge handrails shall be provided along the length of the Pembina Highway Underpass to separate the AT path from Pembina Highway.

C7.5.5 Precast Concrete Elements

(a) All precast concrete elements shall be fabricated at facilities that are certified to the Canadian Precast/Prestressed Concrete Institute (CPCI) Certification Program.

(b) Precast deck elements will not be permitted below grade at the Letellier Grade Separation.

C7.5.6 Bridge Bearings

(a) Allowable bearings types are as follows:

(i) Pot bearings; and

(ii) Steel reinforced elastomeric bearings pads, with or without stainless steel and laminated sliding surfaces.

(b) For all bridge structures, jacking locations shall be provided for future maintenance.

(c) For all bridge structures, fall arrest anchor points shall be provided at each substructure unit location for future inspection and maintenance of the bearings, piers, and abutments.

C7.6 Substructure Design

C7.6.1 Bridge Abutments

(a) Abutment Type

(i) Semi-integral or integral abutments shall be used for all bridge structures; and

(ii) For semi-integral and integral abutments, sufficient distance shall be provided behind the end concrete diaphragm to allow unrestricted thermal movement. The void between the backfill and the end concrete diaphragm shall be filled with Styrofoam pellets. The integrity of the void behind the end concrete diaphragm should be evaluated to ensure backfill does not restrict movement of the deck and girder system. The use of a rigid backfill (e.g., lightweight cellular concrete, void form or Styrofoam) is the preferred method to maintain the integrity of the void.

(b) The horizontal surfaces of all bearings seats shall have a minimum of 1% slope to the abutment face to allow drainage off the bearing seat.

(c) A structure identification date shall be included on all bridges indicating the year of their construction. The date shall be cast into the concrete of each abutment in a prominent location. The size of the structure identification date shall be as shown in Appendix E – Standard Construction Details.

C7.6.2 Bridge Foundation

(a) Allowable foundation pile types are as follows:

(i) Steel H piles;

(ii) Steel pipe piles;

(iii) Precast concrete piles;

(iv) Cast-in-place rock socketed concrete caissons; and

(v) Cast-in-place concrete piles.

(b) All caissons shall be permanently sleeved with steel pipes with a minimum thickness of 20 mm. The steel pipe sleeves should extend for the entire length of the caisson, i.e. terminate at the underside of the abutment footing or pier footing/cap.

(c) Exposed (i.e., above ground level) steel sleeves shall be metalized or hot dip galvanized and shall be painted with a polyurethane coating to match the colour of the surrounding concrete components. Coatings shall extend 1 m below grade. The paint shall be in accordance with Appendix D – Standard Structural Specifications.

(d) The use of reinforced earth and mechanically stabilized earth (MSE) wall support as substructure foundations will not be permitted.

(e) Spread footings will not be permitted.

C7.6.3 AT Path Connection at Pembina

(a) Any tunnel structures shall be designed for rapid installation in order to meet the closure requirements in C18.4.3(b)(i).

(b) Post tensioning of segments shall be required when pre-cast concrete segments are used.

(c) Any tunnel structures shall be comprised of structural concrete.

C7.6.4 Earth Retaining Structures

(a) Retaining Walls

(i) The permitted retaining wall structure types are as follows:

- MSE walls;
- Steel sheet pile walls; and
- Concrete cantilever walls including secant pile walls.

(ii) All retaining walls shall be concrete faced.

(iii) All retaining walls shall have a coping at the top of the wall.

(b) MSE Walls

(i) Two stage MSE wall systems will not be permitted. The MSE walls shall have a precast concrete panel face.

(ii) Granular backfilled steel wire retaining walls will not be permitted.

(iii) The MSE walls shall have a top coping cap and shall be able to accommodate movement of the substrate soils and shrinkage of the coping system.

(iv) The roadway approach barriers shall not be cast on top of the MSE walls.

(v) The City's preferred barrier and wall top treatment is shown in *Appendix E – Standard Construction Details*, which includes the barrier interior to the MSE wall and a cast-in-place concrete coping on top of the wall.

(vi) MSE walls shall not be constructed over any fluid carrying infrastructure including gas lines and municipal utility infrastructure such as but not limited to, aqueducts, feedermains, forcemains, watermains, land drainage sewer, wastewater sewer, or combined sewer.

(vii) Notwithstanding C7.6.4(b)(vi), Project Co will be permitted to construct an MSE wall over the existing land drainage sewer and wastewater sewer lines within Investors Group Field property but not over the watermain. Relocation of the watermain into the Construction Period Lands will be permitted.

C7.7 Durability

C7.7.1 General

(a) City structures shall be designed for a service life of 75 years with the exception of MSE walls that shall be designed for a service life of 100 years. The designs shall recognize the need for ease of replacement of components whose service life is expected to be less than 75 years and the provision of access for inspection and OMR Services.

(b) At a minimum, the concrete curing requirements shall be in accordance with Appendix D – Standard Structural Specifications.

(c) Innovative durability based designs are recommended for all City structures.

(d) Galvanic corrosion should be addressed in areas where dissimilar metals would be in contact. Non-conductive spacers or realignment of structural components should be considered. Reinforcing placement may require adjustment to avoid contact of dissimilar metals. Where reinforcing placement is insufficient to address dissimilar metals contacting, appropriate coating or material substitutions should be provided.

(e) Project Co shall protect against embrittlement of all galvanized reinforcing. At a minimum, protection shall be in accordance with Appendix D – Standard Structural Specifications.

(f) Any stainless steel components shall be constructed separately from black steel components. Drilling and cutting of stainless steel components shall be completed to avoid contamination of the surrounding components. Any discolouration of stainless steel components shall be removed prior to Substantial Completion.

C7.7.2 Bridge Superstructure

(a) The minimum level of protection for a bridge superstructure against deterioration from de-icing salts, freeze-thaw damage and reinforcing corrosion shall consist of:

(i) Structural concrete deck in accordance with Table 2;

(ii) Stainless steel reinforcing;

(iii) Clear cover of the reinforcing in accordance with Table 4; and

(iv) A durable separate wearing surface consisting of either of the following:

- High performance concrete overlay in accordance with Table 2, with a nominal thickness of 50 mm; or
- Asphaltic pavement wearing surface, with a nominal thickness of 90 mm, with an underlying waterproofing membrane.

(b) The minimum technical requirements for structural concrete, including bridge decks and concrete overlays, shall be in accordance with Appendix D – Standard Structural Specifications.

(c) The control of cracking for bridge decks shall be considered. The minimum level of protection against crack control shall consist of:

(i) During placement of concrete for bridge decks, the length of individual deck pour sections shall not exceed 20 m;

(ii) Placement of concrete shall occur in positive moment zones prior to negative moment zones to reduce cracking from camber loss due to the superimposed dead loads of the plastic concrete; and

(iii) The use of fibre reinforced concrete for all structural concrete of the superstructure.

C7.7.3 Bridge Substructure

(a) The minimum level of protection for a bridge substructure against deterioration from de-icing salts, freeze-thaw damage, reinforcing corrosion, and damage from sulphate attack shall consist of:

(i) Structural concrete, in accordance with Table 2, for all of the substructure;

(ii) Galvanized steel reinforcing; and

(iii) Clear cover of the reinforcing in accordance with Table 4.

(b) The minimum technical requirements for structural concrete, including piers and abutments, shall be in accordance with Appendix D – Standard Structural Specifications.

(c) The use of uncoated black steel will be permitted for use in piles, caissons, and footings only. Epoxy coated reinforcing or suitable equal shall be used to transition from uncoated black reinforcing in the caissons, piles, and footings to galvanize or stainless steel reinforcing in attached structural components.

C7.7.4 AT Path Tunnels

(a) The minimum level of protection for a tunnel structure, including approach retaining walls, against deterioration from de-icing salts, freeze-thaw damage, reinforcing corrosion, and damage from sulphate attack shall consist of:

(i) Structural concrete, in accordance with *Appendix D – Standard Structural Specifications*;

(ii) Galvanized steel reinforcing; and

(iii) Clear cover of the reinforcing in accordance with Table 4.

(b) Movement of water around and through the structure should be minimized. At a minimum, the water control should be provided through:

(i) A subdrain system shall be provided on the exterior of the tunnel to remove water from the backfill to the City's land drainage system;

(ii) Subdrains shall not project through the tunnel and shall be extended to the ends of the tunnel for capture in the City's land drainage system;

(iii) Emulsion type damp-proofing shall be provided on all buried surfaces in contact with soil; and

(iv) A waterproofing membrane shall be provided at all joints in the structure, where pre-cast concrete segments are used.

C7.7.5 Earth Retaining Structures

(a) Retaining Walls

(i) Subdrains shall be provided for all Type 1 retaining walls as shown in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*. Subdrains shall not project through the vertical portion of the retaining wall and shall be extended to the ends of the retaining wall for capture in the City's land drainage system; and

(ii) Subdrains are not required for Type 2 and Type 3 retaining walls as shown in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*, but care should be given to management of surface and groundwater behind the retaining walls.

(b) MSE Walls

(i) For the protection and long-term service life of the MSE wall system, drainage and barriers to moisture movement should be considered. At a minimum, all MSE walls shall include the following:

- Drainage system along the interior face of the wall to capture water within the MSE wall system and drain to the City's land drainage system. Refer to *Appendix E – Standard Construction Details*;
- An impervious membrane above the retaining wall fill but below the Transitway structure and barriers to capture water laden with de-icing salts and other contaminants and drain to the City's land drainage system. Refer to *Appendix E – Standard Construction Details*; and
- Cleanout locations along the length of the retaining walls sufficient to provide adequate access for removal of debris and material caught in the drainage system. All bends in the drainage system piping shall be less than 45° to facilitate cleanout operations.

(ii) The minimum level of protection for MSE walls against deterioration from de-icing salts, freeze-thaw damage, reinforcing corrosion, and damage from sulphate attack shall consist of:

- Structural concrete, in accordance with Table 2;
- Galvanized steel reinforcing; and
- Clear cover of the reinforcing in accordance with Table 4.

(iii) Backfill material shall be compatible with long-term durability and performance of the soil reinforcement and precast concrete panels;

(iv) Where steel reinforcement is used, the reinforcing shall be hot-dip galvanized; and

(v) The minimum technical requirements for structural concrete, backfill material, soil reinforcement, and panel reinforcing shall conform to Appendix D – Standard Structural Specifications.

C7.7.6 Culverts

(a) The minimum level of protection for culverts against deterioration and corrosion shall consist of:

(i) All corrugated steel piping used for conveying water shall be hot-dip galvanized or aluminized for a design life of 50 years; and

(ii) All cast-in-place concrete culverts shall receive waterproofing complete with protection board, on the exterior of the concrete, prior to backfilling.

C7.7.7 Girders

(a) Structural Steel

(i) The minimum level of protection for structural steel against deterioration and corrosion from de-icing salts, thermal effects, and exterior exposure shall consist of:

- All steel bridge components shall be hot-dip galvanized or zinc metalized. The use of weathering steel will not be permitted; and
- A polyurethane seal coat shall be applied to all hot-dip galvanized and zinc metalized surfaces. Exterior girder surfaces shall have a pigmented coating to ensure a uniform colour and texture.

(b) Pre-cast Concrete Girders

(i) The minimum level of protection for pre-cast concrete girders against deterioration from de-icing salts, freeze-thaw damage, and reinforcing corrosion shall consist of:

- All pre-cast concrete members shall utilize GFRP stirrups and reinforcing. Black steel other than the pre-stressing strands will not be permitted; and

- All dowels projecting from pre-cast concrete girders and extending into the concrete bridge deck shall be stainless steel reinforcing.

C7.7.8 Concrete Coatings

(a) After Construction, but prior to Substantial Completion, an approved silane sealer shall be applied to all concrete surfaces which are susceptible to deterioration by water and de-icing salts. The following elements shall be treated:

(i) All structural concrete exposed to salt spray;

(ii) All exposed concrete surfaces of the bridge superstructure;

(iii) Exposed concrete pier surfaces. Sealing for abutments is not required provided they are not susceptible to salt spray;

(iv) Exposed concrete retaining walls and MSE wall panels; and

(v) For tunnel structures, any exposed concrete not including the roof.

(b) Approved silane sealers shall be in accordance with Appendix D – Standard Structural Specifications.

C7.7.9 Steel Coatings

(a) Hot-dip galvanizing shall provide a minimum coating of 600 g/m^2.

(b) Zinc metallizing shall provide a minimum coating thickness of 12 mils.

(c) At a minimum, all structural steel shall be blast cleaned to SSPC:10 prior to hot-dip galvanizing or metallizing.

C7.8 The City has had successful experience with these durability based designs and protection systems and is satisfied with their performance. Alternative design and protection systems for the various structures and components shall not result in a higher level of maintenance, rehabilitation and/or replacement over the last 45 years of the structures service life (after handback) than the City's minimum requirements and preferred systems.

C7.9 Materials

C7.9.1 Concrete

(a) Supply of concrete shall be in accordance with Appendix D – Standard Structural Specifications

(b) Table 2 below summarizes the concrete requirements for each component of the City structures.

Table 2: Minimum Requirements for Hardened Concrete

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Max Agg. Size	Special Requirements	Post Residual Cracking Index
Type 1	Lean Mix Concrete	15 @ 28 Days	S-1	2	20 mm		
Type 2	Caissons, Piles, Footings	35 @ 56 Days	S-1	2	20 mm		
Type 3	Cast-in-Place Culverts, Retaining Walls, Abutment Backwalls, Approach Roadway Traffic Barrier Footings, MSE Wall Panels, Pile Caps, Grade Beams, Abutment Seats, and Slope Protection	35 @ 28 Days	C-1	1	20 mm		

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Max Agg. Size	Special Requirements	Post Residual Cracking Index
Type 4	Pier Columns or Shafts, Pier Cap, Diaphragms, Deck Slab, Approach Slabs, Bridge Traffic Curbs and Barriers, Bridge Sidewalks, Retaining Wall and MSE Coping, and Approach Roadway Traffic Barriers	35 @ 28 Days	C-1	1	20 mm	Synthetic Fibres	0.15
Type 5	High Performance Concrete Overlay	45 @ 56 Days	C-XL	1	14 mm	Crushed Granite Aggregate; Synthetic Fibres; maximum Shrinkage Strain of 450 microstrains @ 56 Days; Set Retarders permitted	0.15
Type 6	Precast Concrete	40 @ Release (f'ci) 55 @ 28 Days	C-1	1	14 mm	Maximum Air Void Spacing Factor for Hardened Concrete of 0.23 mm	

C7.9.2 Reinforcing

(a) Reinforcing shall conform to the requirements of Appendix D – Standard Structural Specifications.

(b) Table 3 below summarizes the reinforcing requirements for each component of the City structures.

Table 3: Reinforcing Type by Component

Component	Type of Steel Reinforcing
Bridge Decks, Barriers, Curbs, Sidewalks, Medians, and Approach Slabs.	Stainless Steel Reinforcing
Bridge Substructure, Piers, and Abutments.	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Caissons, Piles, and Footings.	Uncoated Black Steel Reinforcement
Between Caissons, Piles and Footings, and Bearing Seats and Pier Shafts/Columns.	Epoxy Coated Steel Reinforcement or Suitable Equal
Culverts and Tunnel Foundation, Walls, and Roof.	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Retaining Walls (including piles, MSE walls, and concrete facings), and Slope Protection	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Pre-cast Concrete Girders	Black Steel Prestressing Strands and GFRP Reinforcing. Stainless Steel Reinforcing for Dowels into Deck

(c) Epoxy coated reinforcing shall not be used in any locations other than connections between structural components where transitioning from uncoated black to galvanized or stainless steel reinforcing.

(d) The lap length and development length of steel reinforcing shall confirm to the requirements of CAN/CSA S6-14 Canadian Highway Bridge Design Code,

CAN/CSA-G30.18-M09, and ASTM A955. At a minimum, the lap length for reinforcing bars shall be 40 d_b, where d_b is diameter of the reinforcing bar.

(e) Table 4 below summarizes the minimum clear cover of reinforcing for structural concrete:

Table 4: Minimum Reinforcing Cover by Component

Component	Reinforcing Cover
Concrete cast against and permanent in contact with soil	100 mm
Concrete exposed to soil	75 mm
Concrete exposed to de-icing salts	65 mm
Bridge deck top layer	65 mm
Bridge deck bottom layer	50 mm
All other locations	60 mm

(f) A survey of the clear cover shall be completed for the top of the bridge deck and the interior face of the barriers. Concrete areas with cover not within specified tolerances shall be replaced.

C7.9.3 Prestressing Reinforcing

(a) All prestressing strands shall be seven wire uncoated, low relaxation strands, confirming to CSA G279, Grade 1860MPa.

(b) The minimum clear cover for all prestressing strands and reinforcing in precast concrete members shall be 35 mm.

C7.9.4 Structural Steel

(a) All miscellaneous metal shall conform to CAN/CSA G40.21-13, Grade 300W or greater.

(b) Steel H and pipe piles shall conform to the requirements of CAN/CSA G40.21-13, Grade 350W or greater.

(c) Steel for girders receiving hot-dip galvanizing or zinc metalizing shall conform to the requirements of CAN/CSA G40.21-13, Grade 350WT, Category 3 or greater for girders, cover plates, welded attachments, pier and abutment diaphragms, and sole plates. Grade 350W or greater may be used for bracing members bolted to the girders.

C7.10 Standard City Details and Specifications

C7.10.1 Unless otherwise approved by the City in writing, the standard details and specifications found in *Appendix D – Standard Structural Specifications* and *Appendix E – Standard Construction Details* shall constitute the minimum requirements for construction of City structures. These specifications may be used by Project Co Parties as a basis for development of the construction specifications as required in C5.1(c).

C7.10.2 Throughout *Appendix D – Standard Structural Specifications*, all references to “Contractor”, “Contract Administrator”, and “the City” are for consistency with current documents and are not in agreement with the A2 Definitions. All references to “Contractor” shall be interpreted as Project Co, all references to “Contract Administrator” shall be interpreted as Project Co’s engineer of record, and all references to “the City” shall be interpreted as the City Representative.

C7.10.3 Throughout Appendix D – Standard Structural Specifications, all references to cost, expense, and payment should be ignored and were kept in the specifications for clarity of use and consistency of existing documents.

C7.11 Tunnel Lighting

C7.11.1 All lighting shall be appropriately designed and installed to provide safety for Infrastructure Users.

C7.11.2 Lighting beneath a structure and for a tunnel shall be designed to provide appropriate lighting transition when traveling through the tunnel in both day-time and night-time conditions, to not cause disruption to the driver.

C8. OVERHEAD SIGN STRUCTURES

C8.1 General

C8.1.1 The following list is the locations where existing overhead sign structures and large signs attached to a bridge structure are located on Existing Infrastructure, which will require sign replacement and/or structure relocation as part of the Project.

(a) Overhead sign structures are located at:

(i) S572 – Pembina Highway southbound, south of Calrossie Boulevard;

(ii) S677 – Jubilee Avenue westbound, east of Pembina Highway;

(iii) S738 – Pembina Highway northbound, north of Harrow Street;

(iv) S739 – Pembina Highway southbound, south of Harrow Street; and

(v) S576 – Pembina Highway southbound, north of Jubilee Avenue, immediately before the ramp exit.

(b) Signs on Structures are located at:

(i) Northbound Pembina Highway on the Jubilee ramp overpass structure; and

(ii) Eastbound Bishop Grandin Boulevard on the CN rail structure (two at this location).

C8.1.2 As-built information for these overhead sign structures have been provided as Project Background Information.

C8.2 Design

C8.2.1 The design of overhead sign structures connected to any new CN structures shall be subject to CN approval and shall follow the review process outlined in C23.4.2. Based on CN's requirements, connection to the structures may not be permitted. Separate overhead sign structures may be required and could include either overhead (bridge) or cantilevered type structures.

C8.2.2 Content and layout of the overhead and cantilevered signs shall be designed by Project Co and submitted to the City Representative for review in accordance with Schedule 5 – Review Procedure. The City of Winnipeg Traffic Management and Traffic Services Department shall review the signs for pole location, and sign layout and content.

C8.2.3 Overhead and cantilevered sign structures shall be designed in accordance with the requirements of AASHTO "LRFD Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", latest edition plus interims to be structurally and functionally safe in terms of accommodation of traffic, OMR Services for the duration of the 75-year service life, and the following additional criteria:

(a) Equation 3.8.1-1 of AASHTO Clause 3.8.1 shall be modified as follows:

(i) $Pz = 2.7\ q\ Kz\ Cd$; and

(ii) Where q shall be taken from CAN/CSA S6-14, Table A3.1.1 for a return period of 50 years.

(b) The design ice thickness for ice accretion shall be the value given in CAN/CSA S6-14, Figure A3.1.4;

(c) Overhead sign structures shall be designed for fatigue based on the equivalent static pressure associated with galloping, natural wind gust, and truck-induced gust, as applicable in accordance with AASHTO LRFD Standard Specifications. Fatigue importance factors shall be selected based on Fatigue Category I.

C8.2.4 Pile Foundations

(a) Pile foundations shall be designed in accordance with CAN/CSA-S6-14, the CHBDC to be structurally and functionally safe in terms of accommodation of traffic, OMR Services for the duration of the 75-year service life.

C8.2.5 Structure Type

(a) All overhead sign structures shall be galvanized steel structures. Aluminum structures will not be permitted.

(b) Straight-tapered octagonal or dodecagonal monotubular elements shall be used. Bent "davit" type elements are not permitted.

(c) Sign panel mounting brackets shall consist of galvanized steel clamps fastened together using galvanized or stainless steel fasteners. Clamps shall be connected to the sign panel using stainless steel fasteners.

(d) All structures and attachments shall be hot-dip galvanized after fabrication of the elements is complete.

(e) All structures shall be furnished with access holes (handholes) near the base, minimum size 125 x 300 mm. Structures shall be detailed and furnished with appropriate hardware (openings, couplers, etc.) to permit running electrical conductors (wires) inside the structure.

C8.2.6 Camber and Minimum Clearance

(a) Cantilever sign support structures shall be provided with a two degree upward camber.

(b) Bridge-type (i.e., non cantilevered) sign support structures shall be provided with a minimum permanent camber of Span/125.

(c) The minimum vertical clearance below the sign panels shall be 5.3 m.

C8.3 Construction

C8.3.1 At a minimum, construction of overhead sign structures shall be in accordance with Appendix D – Standard Structural Specifications.

C8.4 Signage

C8.4.1 Traffic Services will make all fabrication changes to existing sign panels. Project Co shall remove and deliver existing sign panels requiring fabrication changes to Traffic Services at 421 Osborne Street, including new aluminum panel material and mounting brackets for the existing signs. Project Co will then pick up and install the completed replacement signs.

C8.4.2 Any new overhead sign structure locations, large side mounted sign requirements, and large signage attached to a bridge that will be needed, will be fabricated by Traffic Services and picked up and installed by Project Co. All mounting hardware shall be supplied by Project Co. Should new overhead sign structures be required for these signs to be attached to, these shall be constructed by Project Co.

C8.4.3 Any temporary directional signage required during relocations shall be erected, installed, maintained, removed, and returned by Project Co.

C9. STATIONS AND STOPS DESIGN REQUIREMENTS

C9.1 Overview

C9.1.1 Stations and stops at locations shown in Figure 28 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* are to be provided. The “stations” are to be aesthetically compatible in design with Fort Rouge Station and Jubilee Station built on Stage 1 of the Southwest Transitway. The “stops” are to be aesthetically compatible with the design used by Winnipeg Transit for its on-street bus stop upgrade program. Two of the “stations” (IGF Station and University of Manitoba Station) are to use special designs that consider their specific contexts.

C9.1.2 For the "stations", general layouts of Standard, Large, and Split are shown in Figures 30, 31, and 32, respectively, of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*. The Standard and Split stations are to be sized to accommodate five standard (40') buses at each platform (see Figure 29 for typical dimensions). The Large stations are to be sized to accommodate eight standard (40') buses at each platform.

C9.1.3 At certain Project locations where rapid transit service is to operate on-street (Southwood Drive, and University of Manitoba campus), platforms at "stops" are to be sized to accommodate three standard (40') buses. In addition, where rapid transit service is to operate on-street on Southpark Drive, platforms at "stops" are to be sized to accommodate three standard (40') buses if possible, or to the maximum length available, and to a minimum of two standard (40') buses.

C9.1.4 For each required "station" and "stop", the following table lists the general layout and design context considerations.

Table 5: Stations and Stops

Category	Name	General Layout	Design Context Considerations
Stations	Parker	Standard	Includes off-street "Kiss and Ride" (Figure 36, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*)
	McGillivray	Large	Includes off-street "Park and Ride" (Figure 34, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*) Includes off-street "Kiss and Ride" (Figure 36, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*) Includes "Bus Staging Area" (Figures 37a, 37b, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*)
	Clarence	Large	Includes off-street "Park and Ride" (Figure 35, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*) Includes off-street "Kiss and Ride" (Figure 36, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*)
	Chevrier	Standard	
	Plaza	Standard	Includes an at-grade Active Transportation crossing of CN Letellier track to the Hopewell Lands
	Chancellor	Split	Includes on-street "Kiss and Ride" (Figure 36, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*)
	Markham	Standard	Includes on-street "Kiss and Ride" (Figure 36, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*)
	IGF	Special	Large terminal to service events at Investors Group Field Station concept shown in Figure 33, *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*
	U of M	Special	Station to be designed in consultation with University Station concept shown in Figure 20 (Revised), *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* Includes "Bus Staging Area" with Bus Operator Washroom facility
Stops	Southpark Drive		Two stops to be provided at: • Eastbound Southpark Drive, Near-side Pembina Highway • Westbound Southpark Drive, Far-side Pembina Highway
	IGF Station East Access		Two stops to be provided at: • Eastbound IGF Station East Access, Near-side University Crescent • Westbound IGF Station East Access, Far-side University Crescent
	University Crescent		Replacement of waiting amenities (heated shelter, benches, waste receptacles), sign structure, and signage at existing stop at 60103 Northbound University Crescent at Chancellor Matheson Road
	School of Music		Replacement of waiting amenities (heated shelter, benches, waste receptacles), sign structure, and signage at existing stop 60105 at Westbound Dafoe Road at School of Music

Category	Name	General Layout	Design Context Considerations
	Eastbound Dafoe Road		Installation of bus stop poles/flags (using Winnipeg Transit standard for pole, flag, and graphics) at new bus stops on Eastbound Dafoe Road opposite the School of Music Stop 60105 and opposite the University of Manitoba Station
	Chevrier Boulevard		Four stops to be replaced at: • Eastbound Chevrier Boulevard, Near-side Hudson Street • Westbound Chevrier Boulevard, Far-side Hudson Street (including the addition of a new sidewalk connection) • Eastbound Chevrier Boulevard, Near-side Pembina Highway • Westbound Chevrier Boulevard, Far side Pembina Highway

C9.1.5 All design elements on Pembina Highway between Point Road and Stafford Street shall be new. Any elements, such as a bus shelter, totem, etc. to be installed in place of an existing element will require Project Co to remove the existing element. Prior to removing the existing element, Project Co shall provide the City a listing of inventory two weeks in advance of removal and deliver it to the City of Winnipeg Transit yard at 421 Osborne Street.

C9.2 All Design and Construction for the stations shall make reference to the City's identification method for infrastructure.

C9.2.1 The station numbers for the Stage 1 Infrastructure are:

(a) SW01 – Harkness Station;

(b) SW02 – Osborne Station;

(c) SW03 – Fort Rouge Station; and

(d) SW04 – Jubilee Station.

C9.2.2 The station numbers for the New Infrastructure shall be as follows:

(a) SW05 – Parker Station;

(b) SW06 – McGillivray Station;

(c) SW07 – Clarence Station;

(d) SW08 – Chevrier Station;

(e) SW09 – Plaza Station;

(f) SW10 – Chancellor Station;

(g) SW11 – Markham Station;

(h) SW12 – IGF Station; and

(i) SW13 – University of Manitoba Station.

C9.3 Design Elements for Parker, McGillivray, Clarence, Chevrier, Plaza, Chancellor, and Markham Stations

C9.3.1 To ensure consistency in rapid transit operations, branding, and passenger use, and to provide standardization in materials to minimize on-going OMR Services costs, the design elements for stations in the Project are to be aesthetically compatible to those used for Fort Rouge Station and Jubilee Station of the Stage 1 of the Southwest Transitway. The stations are to be characterized by:

(a) Two travel lanes in each direction within the station limits except for Markham Station, which shall have only one 4.0 m lane in each direction;

(b) Loading platform on each side of stations;

(c) Large heated shelters on each side of stations;

(d) A canopy over the platform on each side of stations (cantilevered, with no supporting structures on the portion of the platform between the shelter and the curb);

(e) Station signage and bus stop signage;

(f) Safety fencing at appropriate locations (including on the median in the station); and

(g) Various passenger amenities (benches, information kiosks, conduits, electrical supply, and mounts for BUSwatch electronic display signs, bus arrival warning system, pedestrian crosswalks across the Transitway, bike racks and lockers).

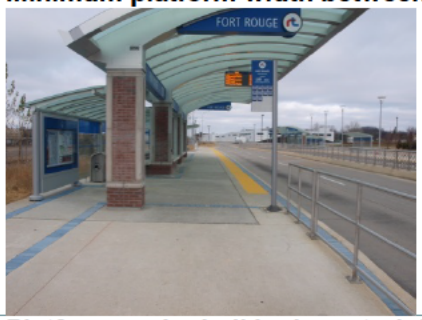
C9.3.2 The following information kiosks with canopy are required to be installed on each platform at each station:

(a) One information kiosk with canopy of the type shown in C9.3.1(g), Table 6, Item 12. The design and dimensions of the information kiosk and canopy are to be aesthetically compatible with those used for this type of kiosk/canopy at Harkness, Fort Rouge, and Jubilee Stations; and

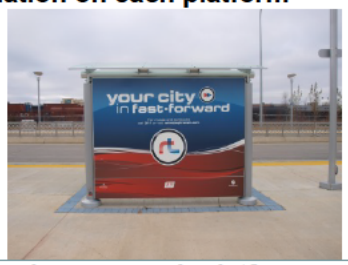
C9.3.3 One information kiosk with canopy integrated with the heated shelter and large canopy referenced in Items 11 and 14, respectively, in C9.3.1(g), Table 6. This information kiosk is to be positioned immediately downstream of the heated shelter (this position is illustrated in the photo for Item 6 of Table 6), and the design and dimensions of the kiosk and canopy are to be aesthetically compatible with those used for this type of kiosk/canopy at Harkness, Fort Rouge, and Jubilee Stations. Table 6 outlines the list of specific design elements to be provided for stations. Where applicable, photos of the design element used in the Stage 1 stations are provided for illustration. For greater certainty, the same design elements as Stage 1 are not required to be provided but the design elements shall be aesthetically compatible with those of Stage 1 to the extent possible without infringing on any Intellectual Property of any third party. For clarity, the City provides no representation or warranty in relation to the Intellectual Property rights of the Stage 1 design elements.

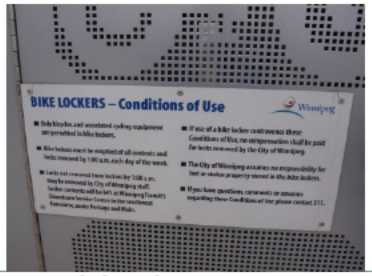
Table 6: Station Design Elements

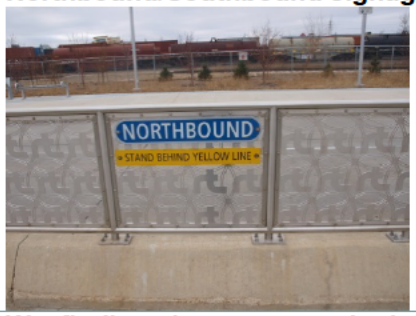
#	Item
1	**Two Transitway lanes in each direction** 
2	**Decorative median fencing (barrier) in station to prevent pedestrian crossings in mid-station area (stainless steel decorative fence incorporating rapid transit logo)**  

#	Item
3	**Crosswalks located at each end of station (approximately 5 m downstream of bus stop pole)** 
4	**Minimum platform width between shelter and curb (3.0 m for Transitway stations)** 
5	**Platform curb shall be in a straight line (no curve) to minimize horizontal gap between bus doors and platform edge** 
6	**High level platform curbs (250 mm)** 

#	Item
7	**Yellow pedestrian warning strip at edge of platforms** 
8	**Pedestrian fencing between bus stop pole and crosswalk to direct pedestrians to crosswalk** 
9	**Bus stop pole and flag on each platform (using Winnipeg Transit standard for pole, flag, and graphics for rapid Transitway stations)** 
10	**Drainage design that prevents water pooling on Transitway in station area and on platforms (to prevent splashing of passengers, formation of ice)**

#	Item
11	**Enclosed heated shelters on each platform, with benches, interior lighting, and four doors**    
12	**Two information kiosks for route and schedule information on each platform**   
13	**Electrical supply and connection mount for BUSwatch signs on each platform** 
14	**Canopy, with internal lighting, extended over width of each platform between the bus stop pole and the upstream end of the enclosed shelter**  

#	Item
15	**Benches with Canopy on each platform**  
16	**Bike Lockers (Eight at each station)**   
17	**Bike Racks with Canopy (minimum of four hanging between rack legs)**  
18	**Waste/Re-cycling Receptacles at each end of each platform**  
19	**Newspaper Box rings on each platform at downstream end of information kiosk area** 

#	Item
20	**Prominent back-lit identification signage on shelter/canopy at stations**    
21	**Prominent back lit pylon identification signage, with integrated information kiosk, at stations**   
22	**Northbound/Southbound signage on median fence** 
23	**Wayfinding signage on each platform** 

#	Item
24	**No smoking signage on shelters, cigarette butt receptacle on each platform (upstream of shelter)**  
25	**Pedestrian-scale lighting throughout station area (see Section 15.1 of *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*)**  
27	**Conduit for communications lines as described in C6.7.13 (e.g., fibre optic cable for CCTV)**[1] 

[1] Note that communications/CCTV systems are to be supplied and installed as separate City initiatives.

#	Item
28	**Conduit, detector loop, chime and light post for bus arrival warning system (for each of northbound and southbound directions)** 
29	**High quality pedestrian and cycling connections to station**  
30	**Convenient Kiss and Ride drop-off/pick-up area adjacent to station**
31	**Handi-Transit pick-up/drop-off area adjacent to station**
32	**Convenient access for station OMR Services staff and vehicles**
33	**Accessibility design features (automatic door openers for each shelter, paving bands to delineate a clear path of pedestrian travel, paver square at base of bus stop poles, etc.)** 
34	Landscaping of scale used for Fort Rouge Station, including use of native grasses 

C9.4 Design Elements for IGF Station

C9.4.1 A special purpose station is required at Investors Group Field to accommodate buses serving major events at the stadium. Up to 200 buses are used to transport spectators to and from events. IGF Station shall be designed as described and illustrated in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* and *Appendix FF – IGF Station Bus Parking for Post-Event Service.* IGF Station is to be located adjacent to the north side of the stadium and is to feature the following:

(a) A large central loading platform, approximately 313.0 m in length and 19.5 m in width;

(b) Four lanes on either side of the central platform designed in accordance with Appendix GG – IGF Station Overhead Pedestrian Walkway to accommodate three rows of buses and a peripheral circulation lane;

(c) An overhead pedestrian walkway constructed between the stadium's northwest entrance (Gate 4) and pedestrian ramps leading to the loading platform, with the following requirements:

(i) Project Co shall maximize access to the storage areas below the stadium's north concourse level from both the east and west sides of the overhead pedestrian walkway. Project Co shall negotiate with the Winnipeg Football Club and/or Triple B Stadium Inc. the potential loss of access to and storage below the concourse structure, all parties acting reasonably.

(ii) At a minimum, the vehicle service lane used to access the storage areas under the stadium's north concourse level shall be 3.0 m wide;

(iii) The vehicle service lane may be moved from its existing location. Construction of any new portions of the vehicle service lane shall consist of a minimum of 450 mm of compacted aggregate over non-woven geotextile;

(iv) At a minimum, Project Co shall design and construct the overhead pedestrian walkway with the dimensions and shape as shown in *Appendix GG – IGF Station Overhead Pedestrian Walkway*. Project Co may choose to increase the size of the overhead pedestrian walkway provided the dimensions and shape as shown in *Appendix GG – IGF Station Overhead Pedestrian Walkway* is provided. Where Project Co elects to increase the size of the overhead pedestrian walkway, sharp corners and pinch points that would inhibit smooth flow of pedestrians will not be permitted;

(v) Project Co shall be responsible for the associated construction, drainage, and grading within the Investors Group Field property;

(vi) Aesthetics within the Investors Group Field property, around the overhead pedestrian walkway, under the concourse level, and around the parking access points as noted in C9.4.1(h) shall be considered. Re-surfacing and/or upgrades of the vehicle service lanes and under the concourse level is encouraged. In general, Project Co shall address tracking of mud or deterioration of the landscaping associated with use of the storage facilities.

(vii) The overhead pedestrian walkway between IGF Station and Investors Group Field shall not have ramp structures/piers/foundations that conflict with the functionality of the bus circulation lanes;

(viii) The overhead pedestrian walkway between IGF Station and Investors Group Field shall not be structurally connected to the stadium building;

(ix) The gap between the overhead pedestrian walkway and the Investors Group Field shall be spanned with a cover plate. Design of the cover plate shall address potential tripping hazards for the Infrastructure User;

(x) Driven piles will not be permitted for any (deep foundation) structural elements within the Investors Group Field property. Drilled rock-socketed caissons and cast-in-place elements will be permitted;

(xi) A minimum of 0.305 mm (12") shall be provided between any substructure foundation elements and the exterior edge of the stadium;

(xii) Notwithstanding C9.4.1(c)(xi), Project Co's design shall accommodate for the thermal movement of the overhead pedestrian walkway and stadium structures;

(xiii) Deep foundations will be permitted. MSE walls will be permitted as a foundation for the overhead pedestrian walkway, with the exception of support of the grade separated portion of the walkway across the IGF Station bus circulation lanes, i.e., the bridge girders. Where MSE walls are utilized, any fill shall be lightweight materials and Project Co shall be responsible to include aesthetics in the walls that face the IGF Station area; and

(xiv) Lighting shall be provided under the overhead pedestrian walkway.

(d) Bus stop poles/flags (using Winnipeg Transit standard for pole, flag, and graphics) for each of 13 separate loading areas on the platform;

(e) Yellow pedestrian warning strip at edge of platform;

(f) Wayfinding signage on the overhead pedestrian walkway, on the pedestrian ramp, and on the loading platform; and

(g) A dense planting of additional coniferous trees to supplement the existing tree stand on the west side of IGF Station to provide a visual natural screening between the station and the existing and potential future expansion of the Fairway Woods Condominiums development. This additional tree planting will take place as space permits and in accordance with Appendix CC – Boulevard Tree Planting Guidelines as Required Under Development Agreements, City of Winnipeg, November 2011 and Appendix SS – Fairway Woods Visual Natural Screening. Consultations with representatives of the Fairway Woods Condominiums will be required during the development of the detailed design of the visual natural screening. Project Co shall abide by the Neighbourhood Liveability By-law No. 1/2008, as amended, specifically Part 5 Noise Control.

(h) Project Co shall provide a concrete parking access point with mountable curbs for two semi-trucks and a generator adjacent to Investors Group Field as depicted in Appendix NN – Access for Semi-Trailers for IGF Events. Project Co shall also provide an additional access point from the west side of the Investors Group Field semi-trailer parking area to the vehicle service lane used to access the storage areas under the concourse level from the east side of the overhead pedestrian walkway.

(i) Project Co shall provide an asphalt surfaced vehicular approach from the Investors Group Field vehicle service lane to the south lane of the IGF Station and shall be sited near the entrance of the dock area of the Investors Group Field (just east of the north extents of Service St 3 NW). The intent is to provide access for service vehicles (via the Transitway) to the east side of the overhead pedestrian walkway and the associated storage areas under the concourse level.

(j) De-watering the pond adjacent and north of Investors Group Field by pumping out the water to a nearby land drainage system during a low flow period. The pond shall be filled to grade, including the areas of the pond that are immediately outside of the Lands.

(k) Waste/re-cycling receptacles on the platform at the bottom of each end of the ramp, on each side.

(l) Benches on the platform underneath each ramp or against the vertical plane of the ramp edge, per side.

(m) The handrail for the IGF Station ramp shall be subject to the requirements of C7.5.4.

(n) The bridge pedestrian handrails for the IGF Station pedestrian overpass shall be subject to the requirements of C7.5.4. However, aesthetics shall be incorporated in the handrails. At a minimum, the handrails shall include the rapid transit logo and transition to match or complement the existing Investors Group Field Stadium handrails.

(o) The IGF Station ramp shall be enclosed with a solid structure at all locations that are less than 3.0 m in height between the platform and the underside of the ramp structure.

(p) Design and Construction of IGF Station shall be in accordance with D7.

C9.4.2 Lighting System

(a) Project Co shall design and construct a lighting system for the IGF Station that includes lighting of the station platform, bus apron, ramps, and pedestrian overpass (for pedestrian use and underneath the overpass for both the Transitway and service road).

(b) Project Co shall design the lighting system to accommodate a minimum of five lighting scenarios:

(i) During an event at Investors Group Field;

(ii) During day-time operations;

(iii) During low light operations;

(iv) During night-time operations; and

(v) Off, with appropriate street lighting and pedestrian overpass lighting for the Transitway and service road.

(c) The system shall be designed so the lighting is capable of automatically modifying the lighting scenario based on ambient lighting conditions.

(d) The system shall be designed so that the City is capable of controlling the lighting. The control panel shall be placed in its own secure weatherproof enclosure. The controls shall be via a touch screen mounted inside the secure weatherproof enclosure.

(e) The system should be programmable so additional lighting scenarios may be programmed in the future or as required by City Operations.

C9.4.3 A typical cross-section of IGF Station is shown in Figure 27 (revised) of the City of Winnipeg Southwest Transitway Stage *2 – Functional Design Report.*

C9.4.4 The Detailed Design of the station and overhead pedestrian walkway requires consultation with Winnipeg Transit, the Winnipeg Football Club and the University of Manitoba.

C9.5 Design Elements for University of Manitoba Station

C9.5.1 To support its development plans, the University of Manitoba requires that two-way transit service be operated on the portion of Dafoe Road east of University Crescent. To enable two-way operation, the following is required:

(a) A revised layout of University of Manitoba Station; and

(b) A new bus staging area near the east end of Dafoe Road.

C9.5.2 The approximate location for these works is shown in Figure 20 (Revised) of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*.

C9.5.3 The University of Manitoba Station is to include four separate loading areas on the westbound side of Dafoe Road that, from west to east, can accommodate three standard (40') buses, two standard (40') buses, three standard (40') buses, and two standard (40') buses, respectively. The station is to feature the following:

(a) A new bus loading lane to be constructed in concrete within each loading area on the north side of, and immediately adjacent to, the existing westbound curb lane of Dafoe Road, with appropriate curbing to accommodate tapers for bus access/egress to/from the loading areas and pedestrian crosswalk locations as shown in Figure 20 (Revised) of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report;

(b) Enclosed heated shelter (approximately 8' x 40') at each loading area, with benches and interior lighting;

(c) Minimum platform width of 3 m between heated shelter and curb;

(d) High level platform curb (250 mm);

(e) Yellow pedestrian warning strip at edge of platform;

(f) Benches on the platform at each loading area;

(g) Bus stop pole and flag on platform at each loading area (using Winnipeg Transit standard for pole, flag, and graphics for rapid Transitway stations);

(h) Drainage design that prevents water pooling on Transitway in station area and on platforms (to prevent splashing of passengers, formation of ice);

(i) Information kiosks for route and schedule information at each loading area;

(j) Illuminated sign structure at each loading area, with electrical connection and mount for BUSwatch sign;

(k) Canopy extended over width of platform between the bus stop pole and the upstream end of the enclosed shelter in each loading area;

(l) Waste/Re-cycling receptacles at each loading area;

(m) No Smoking signage on heated shelters;

(n) Pedestrian-scale lighting (minimum of 75 lux under the station canopies and 40 lux throughout the remainder of the station with smooth lighting transitions);

(o) High quality pedestrian connections to station;

(p) Accessibility design features (automatic door openers for each shelter, paving bands to delineate a clear path of pedestrian travel, paver square at base of bus stop poles, etc.); and

(q) Landscaping.

C9.5.4 The new bus staging area is required to provide space for 12 bus layover spaces with independent bus access/egress to/from each space and a by-pass lane. A bus operator washroom is to be provided in the bus staging area.

C9.5.5 The Detailed Design of the station, the new bus staging area, and any associated modifications to Dafoe Road requires consultation with Winnipeg Transit and the University of Manitoba.

C9.6 Design Elements for Bus Stops on Southpark Drive, on Southwood Drive, on IGF Station East Access and on University of Manitoba Fort Garry Campus

C9.6.1 New or upgraded bus stops are required, designed to accommodate:

(a) three standard (40') buses, to be implemented by the end of the Construction Period at the following locations:

(i) Eastbound IGF Station East Access, Near-side University Crescent;

(ii) Westbound IGF Station East Access, Far-side University Crescent;

(iii) Northbound University Crescent at Chancellor Matheson Road (Stop 60103); and

(iv) Westbound Dafoe Road at School of Music (Stop 60105).

(b) three standard (40') buses if possible, or to the maximum platform length available, and to a minimum accommodation of two standard (40') buses, to be implemented by the end of the Construction Period at the following locations:

(i) Eastbound Southpark Drive, Near-side Pembina Highway; and

(ii) Westbound Southpark Drive, Far-side Pembina Highway as depicted in Appendix WW – Westbound Southpark Drive Bus Stop Location.

C9.6.2 New bus stops at up to four locations on Southwood Drive may be implemented during the OMR Period. The specific locations for these stops and the timing of the implementation will be dependent on the rate of development in the U of M Southwood Lands and will be determined by the City and the University of Manitoba during the OMR Period. Should these stops be required, this may be done through Project Co as a Change Order.

C9.6.3 Each of these stops is to feature the following:

(a) Enclosed heated shelter at each loading area (approximately 8' x 30'), with benches and interior lighting, except at the eastbound stop of IGF Station East Access;

(b) Minimum platform width of 3 m between heated shelter and curb except for the eastbound Southpark Drive Pembina Highway nearside bus stop, which may have a reduced platform width, if required, to allow the shelter to fit within the property;

(c) Yellow pedestrian warning strip at edge of platform;

(d) Up to two benches on the platform;

(e) Bus stop pole and flag on each platform (using Winnipeg Transit standard for pole, flag, and graphics for rapid Transitway stations);

(f) Drainage design that prevents water pooling on Transitway in stop area and on platforms (to prevent splashing of passengers, formation of ice);

(g) Illuminated "Totem" sign structure (including integrated information kiosk), with electrical connection and mount for BUSwatch sign, as shown below;

(h) Waste/Re-cycling receptacle;

(i) No Smoking signage on heated shelters;

(j) Accessibility Design features (automatic door openers for each shelter, paving bands to delineate a clear path of pedestrian travel, paver square at base of bus stop poles, etc.); and

(k) Landscaping.

C9.6.4 All design elements identified in C9.6.3 shall be new. Any elements, such as a bus shelter, totem, etc. to be installed in place of an existing element will require Project Co to remove the existing element. Prior to removing the existing element, Project Co shall provide the City a listing of inventory two weeks in advance of removal and deliver it to the City of Winnipeg Transit yard at 421 Osborne Street.

C9.7 Park and Ride

C9.7.1 Park and Ride facilities are included at McGillivray Station and at Clarence Station:

(a) At **McGillivray Station**, new parking lots are to be provided on the west side of the Transitway, south and north of Seel Avenue (with total capacity for approximately 700 vehicles). Street connections are to be provided between the parking lots and Seel Avenue and Willson Place. Between the parking lots and Fennel Street, each of Seel Avenue and Willson Place are to be improved to include one eastbound lane and two westbound lanes to accommodate automobile access/egress between the parking lots and the regional street system. The proposed layout for the McGillivray Station Park and Ride is shown in Figure 34 of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report; and

(b) At **Clarence Station**, a new parking lot is to be provided on the west side of the Transitway adjacent to the station (with total capacity for approximately 400 vehicles). Street connections are to be provided between the parking lot and Clarence Avenue and Waller Avenue. Between the parking lot and Irene Street, Waller Avenue is to be

improved to include one eastbound lane and two westbound lanes to accommodate automobile access/egress between the parking lot and the regional street system. The proposed layout for the Clarence Station Park and Ride is shown in Figure 35 of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report.

C9.7.2 These Park and Ride facilities are to have as many stalls as possible while staying within the Construction Period Lands and shall include the following features:

(a) Paved parking lots;

(b) Prominent identification signage;

(c) Prominent wayfinding signage for motorists and pedestrians;

(d) Prominent signage of conditions of use;

(e) Line painting;

(f) Sufficient handicapped parking stalls in accordance with the City of Winnipeg by-law;

(g) Wayfinding signage for motorists is to be provided on McGillivray Boulevard at Fennell Street to direct motorists to McGillivray Station Park and Ride, and on Clarence Avenue at Clarence Station to direct motorists to Clarence Station Park and Ride;

(h) Bike racks as shown in Table 6, Item 17 for at least 16 bicycles;

(i) Lighting;

(j) Drainage;

(k) Curbs;

(l) Fencing; and

(m) Protection of transmission towers in accordance with C22.3.6(a).

C9.7.3 The Design and Construction of the Park and Rides should be carried out in such a manner that the pavement elevations are between 100 mm and 300 mm of the top of the Manitoba Hydro transmission tower foundation elevations.

C9.7.4 These Park and Ride facilities are to adhere to the City of Winnipeg Zoning By-law 200/2006, Part 5: Development and Design Standards.

C9.8 Parking Lots

C9.8.1 Design Elements for Parking Lot at 1260 Clarence Avenue

(a) A reconfigured parking lot at 1260 Clarence Avenue shall be constructed to include as many stalls as possible, up to 750 parking stalls on the west side of the Transitway within the Manitoba Hydro Right-of-Way contingent on an agreement being reached between the owner of 1260 Clarence Avenue and Manitoba Hydro. The parking lot constructed shall be to an as is or better condition and shall address any repairs required due to the Manitoba Hydro Transmission Line Relocation.

(b) The parking lot shall be similar to the existing lot with an automobile for a design vehicle, and shall have, but not be limited to, the following features:

(i) Asphalt surface;

(ii) Parking fences;

(iii) Lighting;

(iv) Drainage devices;

(v) Electrical plugs for all stalls;

(vi) Line painting;

(vii) Parking Curb; and

(viii) Protection of transmission towers in accordance with C22.3.6(a).

(c) The pavement design for the parking lot shall take into account the feedermain and aqueduct below the parking lot and shall be submitted to the City Representative in accordance with Schedule 5 – Review Procedure.

(d) During construction, Project Co shall coordinate the construction of the parking lot with Manitoba Hydro, and the business at 1260 Clarence Avenue to ensure adequate space available for use at all times during construction.

(e) The Design and Construction of the parking lot should be carried out in such a manner that the pavement elevations are between 100 mm and 300 mm of the top of the Manitoba Hydro transmission tower foundation elevations.

C9.8.2 Design Elements for parking lots on the east side of the Transitway between Markham Road and Southpark Drive:

(a) Realignment of apartment parking lots affected by the New Infrastructure to maintain as many as possible, up to their existing number of parking stalls within the Construction Period Lands;

(b) Creation of a separation between the parking lots along the CN Right-of-Way between Markham Road and Southpark Drive to prevent vehicles from cutting through;

(c) Provide a turnaround on the south side of Southpark Drive just prior to the CN Right-of-Way to allow for errant vehicles to turn around when they reach the Transitway; and

(d) The parking lot shall be similar to the existing lot with an automobile for a design vehicle, and shall have, but not be limited to, the following features:

(i) Asphalt surface;
(ii) Parking fences;
(iii) Lighting;
(iv) Drainage devices;
(v) Electrical plugs for all stalls;
(vi) Line painting; and
(vii) Parking curb.

C9.8.3 Design elements for parking lot on the east side of the Transitway between Chancellor Drive and Bishop Grandin Boulevard

(a) Realignment of apartment parking lot affected by the New Infrastructure to maintain their existing number of parking stalls;

(b) The parking lot shall be similar to the existing lot with an automobile for a design vehicle, and shall have, but not be limited to, the following features:

(i) Asphalt surface;
(ii) Parking fences;
(iii) Lighting;
(iv) Drainage devices;
(v) Electrical plugs for all stalls;
(vi) Line painting; and
(vii) Parking curb.

C9.8.4 Parking lost at 75 Southpark due to the extension of Southpark Drive to the Transitway shall be replenished by Project Co by adding to the existing parking lot the number of stalls lost.

C9.8.5 Parking lots are to adhere to the City of Winnipeg Zoning By-law 200/2006, Part 5: Development and Design Standards.

C9.9 Kiss and Ride

C9.9.1 Kiss and Ride facilities are designed to accommodate passengers making a mode change between rapid transit and automobile passenger to complete their trips. These Kiss and Ride facilities are to include the following features:

(a) Paved parking lots;

(b) Prominent signage of conditions of use;

(c) Line painting;

(d) Sufficient handicapped parking stalls in accordance with the City of Winnipeg by-law;

(e) Lighting;

(f) Drainage;

(g) Curbs; and

(h) Fencing.

C9.9.2 The following criteria were used to guide the development of Kiss and Ride locations for the Project:

(a) Siting of pick-up/drop-off locations in close proximity to station platforms;

(b) Siting of Kiss and Ride facilities off-street, where space permits;

(c) Integration of Kiss and Ride facility with Park and Ride facility at stations where Park and Ride is provided;

(d) Provision of direct pedestrian paths between pick-up/drop-off locations and station platforms;

(e) Provision of short-term (15 minutes) parking spaces for waiting automobiles at each Kiss and Ride facility;

(f) Excellent automobile access/egress between Kiss and Ride parking area and the regional street system;

(g) Siting of automobile access/egress paths to/from the Kiss and Ride parking that minimizes traffic impacts on nearby residential Roadways; and

(h) Segregation of automobile traffic from bus operations.

C9.9.3 As listed in Table 7 and shown in Figure 36 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*, Kiss and Ride facilities are to be provided at these stations:

Table 7: Proposed Kiss and Ride Facilities

Station	Type	Number of Parking Spaces
Parker	Off-Street	14 in designated parking area
McGillivray	Off-Street, Integrated with Park and Ride	12 in drop-off/pick-up lane adjacent to station platform
Clarence	Off-Street, Integrated with Park and Ride	12 in drop-off/pick-up lane adjacent to station platform
Chancellor	On-Street	Three in recessed parking area on westbound Chancellor, Three in recessed parking area on eastbound Chancellor
Markham	On-Street	Three in recessed parking area on westbound Markham, Three in recessed parking area on eastbound Markham

C9.9.4 Wayfinding signage for motorists is to be provided on Waverley Street at Hurst Way to direct motorists to Parker Station Kiss and Ride

C9.10 Bus Staging Areas

C9.10.1 Bus staging areas are required at two locations:

(a) At McGillivray Station; and

(b) On the Fort Garry Campus of the University of Manitoba.

C9.10.2 The bus staging area at McGillivray is to be designed to function as follows:

(a) For pre-event service to Investors Group Field, buses would stage in the northbound direction on the west side of the regular southbound platform and in the southbound direction on the east side of the southbound platform (see Figure 37a of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report). Buses destined to Investors Group Field would be loaded from either side of the regular southbound platform, or from only the east side of the platform if buses staged in the northbound direction are to be pulled around to the east side prior to loading. On the east side of the platform, the bus position at the head of the stop would remain open for use by regular southbound rapid transit service;

(b) For post-event service from Investors Group Field, buses terminating at McGillivray Station to return to Investors Group Field for a subsequent trip would make a northbound left turn at the north end of the station to operate in the southbound direction on the west side of the regular southbound platform (see Figure 37b of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report). Passengers would alight onto a platform on the west side of the arriving buses and walk directly to the parking lot without having to cross buses that are exiting the station to return to Investors Group Field or to the garage. Northbound buses from Investors Group Field that are not terminating at McGillivray Station would alight passengers on the regular northbound platform on the east side of the Transitway prior to continuing their northbound trips;

(c) For buses to be inserted into regular northbound rapid transit service, standby buses would stage in the southbound direction on the west side of the regular southbound platform and pull around to the regular northbound stop on the east side of the station to board passengers;

(d) For buses to be inserted into regular southbound rapid transit service, standby buses would stage in the southbound direction on the east side of the southbound platform and would be loaded from the east side of the platform; and

(e) For a regular southbound rapid transit bus that is to short-turn at McGillivray Station, the bus would operate in the southbound direction on the west side of the regular southbound platform and alight passengers onto the platform on the west side of the arriving bus, before turning onto the regular Transitway to operate northbound.

C9.10.3 The bus staging area at University of Manitoba is to be designed to function as follows:

(a) To support its development plans, the University of Manitoba has indicated that two-way transit service is preferred on the portion of Dafoe Road east of University Crescent. To enable two-way operation, the following will be required:

(i) Revisions to the layout of University of Manitoba Station; and

(ii) Construction of a new bus staging area.

(b) To accommodate current and future bus layover volumes for the existing 13 transit routes that operate on campus and potential future additional routes, the bus staging area at the University requires 12 bus layover locations, a by-pass lane, and a bus operator washroom (a single water closet, sink with secure access). The staging area is to be located near the east end of Dafoe Road;

(c) The approximate location for bus staging area at the University is shown in Figure 20 (Revised) of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report. The staging area shall be located downstream of the transit routes that operate to the campus (i.e., east of University of Manitoba Station);

(d) Note that:

(i) The new bus staging area would be used only for bus layovers; no passenger boarding or alighting would take place in the staging area; and

(ii) A heated bus operator washroom shall be included within the bus staging area (with a single water closet, sink with secured access) designed in accordance with *Appendix EE – Winnipeg Transit Comfort Stations (Bus Operator Washrooms)*.

(e) The final layout of the bus staging area, and any associated modifications to Dafoe Road requires further collaboration with Winnipeg Transit and the University of Manitoba.

(f) Appropriate lighting with a lux level between 15 and 20 lux.

C9.11 Landscaping and Aesthetics

C9.11.1 The landscaping and aesthetic design is required to:

(a) Be aesthetically compatible with landscaping and aesthetic treatments (including use of rapid transit logo and colours) for Stage 1 Infrastructure;

(b) Include the Rapid Transit logo in the tiling layout on one of the wing walls at each of the south and north entrances to any tunnel structure at the Letellier Grade Separation to form a gateway feature. The design and dimensions are to be aesthetically compatible to the tiling design for the Rapid Transit logo on the wing walls of the Stage 1 tunnel;

(c) Identify, preserve and protect existing vegetated areas, where possible;

(d) Use strategic plantings and aesthetic treatments to enhance the appearance of structures, earth retaining structures, and noise attenuation walls;

(e) Locate strategic plantings in station areas that enhance station architecture, define and enhance pedestrian paths and waiting areas, screen parking areas, and screen service and maintenance areas;

(f) Plantings of additional coniferous trees will be required to supplement the existing tree stand on the west side of IGF Station to provide a visual natural screening between the station and the existing and potential future expansion of the Fairway Woods Condominiums development. Consultations with representatives of the Fairway Woods Condominiums will be required during the development of the detailed design of the visual natural screening;

(g) Provide shade at rest spots and benches, where possible;

(h) Use treatments along active transportation facilities that define the paths, screen unpleasant views, and provide pedestrian comfort; and

(i) Provide space for Public Art in accordance with C9.15.

C9.11.2 The following design guidelines are used for landscaping and aesthetics:

(a) Adherence to principles of sustainable landscapes, including use of naturalized plantings that are salt tolerant, that are appropriate for the location, and that require low maintenance;

(b) Adherence to CPTED Guiding Principles;

(c) Compliance with the Universal Design Policy, the Universal Design Guiding Principles and the Accessibility Design Standards of the City of Winnipeg;

(d) Tree plantings and tree protection shall comply with guidelines in the City of Winnipeg Tree Planting Details and Specifications Downtown Area and Regional Streets;

(e) Tree plantings shall comply with City of Winnipeg Urban Forestry Diversity Guidelines as per City of Winnipeg Boulevard Tree Planting Guidelines as Required under Development Agreements (e.g., variety of deciduous and coniferous trees, with no more than 30% of a single genus) and City of Winnipeg Acceptable Tree Species for Boulevard Tree Plantings;

(f) Compliance with requirements specified by the City of Winnipeg Naturalist, including for use of native grasses;

(g) Preparation of a tree protection plan (prepared by a certified arborist) prior to construction;

(h) Raised planters are to be used for trees and shrubs at stations, where possible;

(i) Street trees in pavement require a minimum of 8.5 cubic metres of soil per tree;

(j) All planting areas at stations and in Park and Ride facilities require a subgrade drainage system connected to the Transitway drainage system;

(k) Precast concrete paving stones, aesthetically compatible with those used for Stage 1 Infrastructure, are required to define platform areas, pedestrian amenity zones, and bus stop pole locations in stations;

(l) Yellow detectable warning panels are required to be installed in a continuous band along platform edges in stations;

(m) Deciduous shade trees are to be provided along the length of the primary AT path with suitable growing conditions in accordance with City of Winnipeg Tree Planting Details and Specifications for Downtown Area and Regional Streets;

(n) Benches, waste receptacles, and recycling receptacles are to be provided at rest spot and bench areas;

(o) On the Transitway connection between the CN Right-of-Way for the CN Letellier subdivision and the University of Manitoba, deciduous Roadway trees are to be provided in the sodded boulevards on both sides of the Roadway;

(p) At on-street bus stops on the Transitway connection between the CN Letellier subdivision and the University of Manitoba and on the university campus, deciduous trees in pavement (with a minimum of 8.5 cubic metres of soil per tree) are to be planted where possible, and precast concrete paving stones are required to define platform areas, pedestrian amenity zones, and bus stop pole locations;

(q) Designated snow storage sites, established in consultation with the Public Works Department and Project stakeholders, are to be located along the Transitway at places that do not conflict with landscaping/aesthetic treatments at stations, with Transitway gateway features, or Manitoba Hydro requirements;

(r) Center medians are to include a concrete splash strip and the plant material to be a salt tolerant species mix. The location and extent of the salt tolerant species on the boulevard to be determined by modelling the extent of salt spray and drift from winter road maintenance and traffic flow. Soil and seeding methods shall be at a minimum, in accordance with the City of Winnipeg Standard Construction Specifications and C27.7;

(s) Plant and landscape amenities proposed beyond the salt tolerant plantings to be designed to ensure safe access for City Work and Utility Company crews. Soil and planting methods shall be at a minimum in accordance with the City of Winnipeg Standard Construction Specifications;

(t) Proposed tree planting to follow procedures outlined in the City of Winnipeg Tree Planting Details and Specifications Downtown Area and Regional Streets to meet compensation requirements and shall be submitted in accordance with Schedule 5 – Review Procedure

(u) Adherence to Winnipeg Transit's Rapid Transit Visual Identity Guidelines found in Appendix F – RT Symbol Design Details; and,

(v) Adherence to City of Winnipeg Zoning By-law 200/2006, Part 5: Development and Design Standards, Landscaping and Buffering;

(w) Further gateway features shall include prominent gateway signage at the following locations:

  (i) On McGillivray Boulevard at Fennell Street to direct motorists to McGillivray Station Park and Ride and Kiss and Ride;

  (ii) On Clarence Avenue at Clarence Station to direct motorists to Clarence Station Park and Ride and Kiss and Ride;

  (iii) On Waverley Street at Hurst Way to direct motorists to Parker Station Kiss and Ride; and

  (iv) At Pembina Highway and Plaza Drive (west side) to direct pedestrians and cyclists to Plaza Station.

C9.12 Station and Pathway Lighting

C9.12.1 While standard street lighting will be installed throughout the length of the Transitway, additional lighting is required in station areas and along portions of the AT paths where the Transitway street lights do not provide sufficient illumination. In general, the guidelines used for pedestrian lighting for Stage 1 of the Southwest Transitway are used for the Project.

C9.12.2 The following guidelines are used for the design of station lighting:

(a) Light levels on the platform shall be a minimum of 75 lux under the station canopies and 40 lux throughout the remainder of the station with smooth lighting transitions;

(b) Lighting shall be included in the roof structures of all canopies and shelters;

(c) The light source for canopies and shelters shall use an LED system with polycarbonate diffusers;

(d) Pedestrian lights are to match the style and type of fixture used for pedestrian lights in the Southwest Transitway – Stage 1 stations;

(e) The light source for pedestrian lights shall be LED;

(f) Pedestrian lights shall be located behind the platform (a minimum clear area of 3 m is required on the platform so passenger sight lines of arriving buses are not obscured);

(g) The spacing of pedestrian lights shall be arranged to provide the required lighting levels on station platforms;

(h) Light level measurement shall include all light sources, including street lights, pedestrian lights, canopy lights, and shelter lights;

(i) All lighting shall be equipped with shielding, lenses, or cut-off devices to eliminate light trespass and glare for adjoining properties; and

(j) All LED lighting shall be of current technology at the time of construction.

C9.12.3 The following guidelines are used for the design of pathway lighting:

(a) Light levels on AT paths shall, at a minimum, meet the recommended illumination set out in Appendix PP – AT Path Recommended Illumination;

(b) The design and installation of the pathway lighting shall be coordinated with Manitoba Hydro;

(c) The pathway lighting design shall be integrated with rest spot and bench locations, pathway intersections, and station lighting;

(d) Pathway lights are to match the style and type of acorn fixture used for pathway lights in the Stage 1 Infrastructure;

(e) The light source should be LED;

(f) The pathway lighting shall be equipped with shielding, lenses, or cut-off devices to eliminate light trespass and glare for adjoining properties; and

(g) All LED lighting shall be of current technology at the time of construction.

C9.13 Fencing

C9.13.1 At a minimum, the following fencing is required for the Project:

(a) Decorative Fencing

(i) Between stations and the rail track within the CN Letellier subdivision. The decorative fencing at the stations shall extend 20 m beyond each end of the platform.

(ii) Along the lower retaining walls of the Pembina Highway Underpass (i.e., the barriers to separate vehicles and the AT path).

(iii) Between the Transitway runningway and the AT path in the Transitway Underpass of CN Wye Tracks. This is only required in areas where the elevation of the AT path is not 914 mm below the top of the roadway barrier.

(iv) Along the east side bus access/egress for the IGF Station east access bus stop.

(b) Decorative Median Fencing (Barrier)

(i) Mounted on the median barrier at all non-split stations, including Parker Station, McGillivray Station, Clarence Station, Chevrier Station, Plaza Station, and Markham Station.

(c) Standard Fencing

(i) Between the Transitway runningway and the rail track within the CN Letellier subdivision.

(ii) Between the Transitway runningway and the AT path within the CN Letellier subdivision.

(iii) Along the retaining walls of a grade separation structure, including but not limited to, the Pembina Highway Underpass, Transitway Underpass of CN Wye Tracks, and any tunnel structure.

(iv) Along the retaining wall north of the CN Rivers subdivision, west of Pembina Highway.

(v) Along the north and west sides of IGF Station (to prevent pedestrian use of bus access, bus egress, and bus circulation areas of the station).

(vi) Between the AT path and the rail track where the AT path is adjacent to the CN Right-of-Way.

(vii) Along the upper retaining walls of the Pembina Highway Underpass (i.e., any walls used to support the structures or embankments at the top of the slopes).

(viii) Along the property line separating Triple B Stadium Inc. and IGF Station, with allowance for the openings required for the vehicle service lane and semi-trailer access.

C9.13.2 Additional fencing may be required based on Project Co's detailed design and should be sited to ensure the safety of the Infrastructure User at all locations.

C9.13.3 Where standard fencing requirements listed above in C9.13.1(c) meet, these fences shall connect to prevent openings that could potentially allow access to the Transitway, CN rail track, or Letellier Grade Separation from the AT path along the CN Letellier subdivision.

C9.13.4 Fencing Types:

(a) Decorative Fencing

(i) Decorative fencing shall be designed to include the rapid transit logo for areas along the Transitway. It is not necessary to include the rapid transit logo for each fence panel but the logo should be repeated at a maximum spacing of 15 m.

(ii) Decorative fencing may be designed to not include the rapid transit logo in areas where it is not adjacent to the Transitway, for example, the Pembina Highway Underpass retaining walls.

(iii) Overall design theme for the decorative fencing should vary by location to ensure consistency with surrounding appurtenances and the Aesthetics Plan.

(iv) All material for the decorative fencing shall be aluminum or stainless steel.

(v) All decorative fencing shall be 1.829 m in height.

(vi) An example of a decorative fencing from the Stage 1 Infrastructure is a 1.829 m aluminum fence (silver with 'Transit' blue) and is located along the south limit of Stage 1.

(b) Decorative Median Fencing (Barrier)

(i) Decorative median fencing for the station median barriers shall prominently display the rapid transit logo and shall be aesthetically compatible with those used for Stage 1 Infrastructure.

(ii) All material for the decorative median fencing shall be stainless steel.

(iii) Decorative median fencing interior panels shall be constructed of 10 ga or thicker plate. Pipe frame shall be constructed of Schedule 80 pipe or better with a minimum height of 820 mm from the underside of the bottom tube to the top of the upper tube.

(iv) All decorative median fencing shall be 1.20 m in height or greater.

(v) The decorative median fencing shall be placed on a concrete barrier, in an aesthetically compatible way to that used for the Stage 1 Infrastructure.

(c) Standard Fencing

(i) Standard fencing shall be galvanized steel chain link fencing or better.

(ii) All standard fencing shall be 1.829 m in height or greater.

C9.13.5 All stainless steel fencing components including, but not limited to, decorative median fencing, decorative fencing, and pedestrian fencing/handrails at the stations, shall be constructed separately from black steel components. Drilling and cutting of stainless steel components shall be completed to avoid contamination of the surrounding fencing. Any discolouration of stainless steel components shall be removed prior to Substantial Completion.

C9.13.6 Fencing will be permitted to be placed on the roadway barriers in the CN Letellier subdivision, south of Bishop Grandin Boulevard. Project Co shall attempt to limit the portion of fencing that is placed on the roadway barriers due to the impacts on snow clearing operations and other safety related considerations. Where fencing is placed on roadway barriers, it shall have a minimum height of 1.0 m and shall be detailed to avoid providing a stepping area for Infrastructure Users to enter the Transitway or the CN rail line.

C9.13.7 Any fencing required to be removed within the U of M Southwood Lands for Design and Construction does not need to be replaced. Any fencing within the U of M Southwood Lands not required to be removed for Design and Construction shall remain.

C9.13.8 Removal of existing chain link fence west of the CN Letellier Subdivision from Markham Road to approximately 110 m north of Markham Road.

C9.14 Communications and Safety Systems

C9.14.1 The following systems are required for the Southwest Transitway:

(a) Electronic BUSwatch displays signs;

(b) Bus arrival warning system;

(c) Closed circuit TV system at stations and at strategic points on the Transitway; and

(d) Bus operations message display signs at strategic points on the Transitway.

C9.14.2 BUSwatch display signs, based on the same technology used for the existing network of BUSwatch signs at major on-street stops and at Stage 1 Transitway stations (equipment supplied by Ferrograph Limited, systems integration by Winnipeg Transit), are to be installed on each platform of the stations and stops shown in Table 8. Note that 10 Type B signs and 18 Type C signs are required. The BUSwatch display signs will be supplied and installed by Winnipeg Transit. Project Co is responsible for the supply and installation of necessary conduits, electrical source, and mounts for BUSwatch display signs at stations and stops.

Table 8: Requirements for BUSwatch Display Signs

Station/Stop	Platform	BUSwatch Sign Type	Number
Parker Station	Westbound	Ferrograph Type C	1
	Eastbound	Ferrograph Type C	1
McGillivray Station	Southbound	Ferrograph Type C	1
	Northbound	Ferrograph Type C	1
Clarence Station	Southbound	Ferrograph Type C	1
	Northbound	Ferrograph Type C	1
Chevrier Station	Southbound	Ferrograph Type C	1
	Northbound	Ferrograph Type C	1

Station/Stop	Platform	BUSwatch Sign Type	Number
Plaza Station	Southbound	Ferrograph Type C	1
	Northbound	Ferrograph Type C	1
Chancellor Station	Southbound	Ferrograph Type C	1
	Northbound	Ferrograph Type C	1
Markham Station	Southbound	Ferrograph Type C	1
	Northbound	Ferrograph Type C	1
EB Southpark, N/S Pembina	Eastbound	Ferrograph Type B	1
WB Southpark, F/S Pembina	Westbound	Ferrograph Type B	1
Southwood Lands (assume two stations, locations to be determined)	2 per station	Ferrograph Type B	4
IGF Bus Stops at University Crescent	Eastbound	Ferrograph Type B	1
	Westbound	Ferrograph Type B	1
NB University Crescent, Opposite Chancellor Matheson	Northbound	Ferrograph Type B	1
WB Dafoe Road at School of Music	Westbound	Ferrograph Type B	1
University Station	Westbound	Ferrograph Type C	4

C9.14.3 A bus arrival warning system, based on the same technology used for the existing system installed at Osborne, Harkness and Jubilee Stations (design by Nova 3 Engineering, equipment supplied by Integrated Protection Technologies), is to be supplied and installed by Project Co at the stations shown in Table 9. The system provides an audible warning (chime) and a visual warning (flashing light) on each side of both crosswalks of the Transitway within stations as buses approach the stations on the high-speed section of the Transitway. (Refer to Project Background Information for further details.)

(a) Similar to the existing system installed at Osborne, Harkness, and Jubilee Stations, the bus arrival warning system shall be programmable for chime sound volume, length of chime and flashing light activation, chime and flashing light delay with variance per direction, and programmable siren driver.

(b) The vehicle detection probes for the bus arrival warning system shall be of sufficient distance from the pedestrian crossing at the stations to allow proper warning to pedestrians of incoming buses. Approximately 200 m from the crossing has been provided for the existing stations.

(c) Transit will provide the chime sounds (.wav files) for integration in the bus arrival warning system. The chimes are unique per service direction (outbound and inbound) and should match the existing chime used for each service direction. The system should be adjusted to chime no less than two times prior to incoming buses crossing the pedestrian crossing.

(d) Note that for detection of northbound buses arriving at Jubilee Station (on the Stage 1 Transitway), an additional detection loop shall be installed on the northbound Stage 2 Transitway upstream of Jubilee Station and such detection loop shall be tied into the existing system for Jubilee Station. The programming in the controllers should be adjusted to account for the addition of a second detection loop. For reference, the additional loop is required to detect and provide warning for buses moving at higher speeds along the Stage 2 Transitway as the existing detection loop location is situated closer to the Jubilee Station to detect and provide warning for the slower moving buses entering from the Jubilee Ramp.

(e) All strobes and speakers for the audible and visual warnings shall be adequately protected against vandalism.

(f) Conduit shall be supplied and installed according to C6.7.13; however, the conduit for the bus warning system shall be in addition to the two conduits outlined in C6.7.13.

Table 9: Requirements for Bus Arrival Warning System

Station	of Approach	Warnings to be Provided for
Parker Station	Westbound	Rapid transit buses and feeder buses
	Eastbound	Rapid transit buses and feeder buses
McGillivray Station	Southbound	Rapid transit buses and feeder buses
	Northbound	Rapid transit buses and feeder buses
Clarence Station	Southbound	Rapid transit buses
	Northbound	Rapid transit buses
Chevrier Station	Southbound	Rapid transit buses
	Northbound	Rapid transit buses
Plaza Station	Southbound	Rapid transit buses
	Northbound	Rapid transit buses
Chancellor Station	Southbound	Rapid transit buses
	Northbound	Rapid transit buses
Markham Station	Southbound	Rapid transit buses

C9.14.4 For purposes of operations management and safety, it is the intention of Winnipeg Transit to install a closed circuit TV (CCTV) surveillance system along the full length of the Southwest Transitway, which will be supplied and installed as a separate City initiative. As per C6.7.13, Project Co is to provide and install conduit for the CCTV system. The City is anticipating a minimum of eight and maximum of 12 CCTV cameras in each station.

C9.14.5 For emergency response and special operations situations, it is the intention of Winnipeg Transit to install electronic bus operations message display signs at strategic points along the Transitway, which will be supplied and installed as a separate City initiative. As per C6.7.13, Project Co is to provide and install conduit for the bus operations message display system.

C9.15 Public Art

C9.15.1 To the extent required for each Individual Art Project, Project Co shall fabricate, construct and install the Artwork in accordance with each applicable Artist Agreement and Good Industry Practice.

C10. DRAINAGE DESIGN REQUIREMENTS

C10.1 This section details the design requirements for the stormwater management facilities. In accordance with the *Drainage Criteria Manual* for the City of Winnipeg, drainage systems shall be designed for a five-year MacLaren rainfall event for closed sewer pipe drainage facilities, 100-year MacLaren rainfall event for open sewer drainage facilities (ditches) that need to provide storage, and 50-year MacLaren rainfall event for pump stations and depressed Transitways or Roadways. Other relevant standards are provided in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* and the *Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65),* or in relevant sections of the Technical Requirements.

C10.2 The Project area is related to five separate sewer districts: the Cockburn Combined District, Somerville Land Drainage District, Riviera Land Drainage District, the Lot 16 Drain Land Drainage District and D'Arcy Land Drainage District. There are up to two depressed sections: the Transitway Underpass of CN Wye Tracks, and the Letellier Grade Separation.

C10.3 Drainage Design of Pembina Highway Underpass

C10.3.1 Project Co shall ensure that the land drainage design and the discharge of the Pembina Highway Underpass conforms to City of Winnipeg standard, and is consistent with the objectives of *Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65)*.

C10.4 Drainage Design of Transitway

C10.4.1 Project Co shall ensure that the land drainage design of the Transitway conforms to City of Winnipeg standard, for any depressed roadways is consistent with the objectives of *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report,* and shall ensure that the design for the Stormwater Management Facilities adhere to the following:

(a) Runoff from the Southwest Transitway located in the Cockburn Combined District may be routed directly to the Parker Pond;

(b) Storage shall be provided for the additional runoff from the Southwest Transitway in the Somerset Land Drainage District and the Riviera Land Drainage District;

(c) Runoff from the Southwest Transitway in the Lot 16 Drain Land Drainage District may be conveyed to the Lot 16 Drain; and

(d) Runoff from the Southwest Transitway in the D'Arcy Land Drainage District may be conveyed to the Glengarry Trunk, or discharged to the Red River by other means.

C10.5 Drainage Design of Depressed Roadways

C10.5.1 Requirements for the land drainage design of the depressed sections of the New Infrastructure:

(a) The depressed Transitway sections and Pembina Underpass shall be designed to ensure safe passage of vehicles during the 50-year design event, as outlined in City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report and the Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65);

(b) Consideration shall be given to the design for heat tape for the catch basins in any tunnels;

(c) For the depressed Transitway sections, pump stations and appurtenances shall conform to the general criteria outlined in City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report, and C10.6;

(d) Process equipment shall conform to City of Winnipeg's Identification Standard; and

(e) All electrical design shall conform to City of Winnipeg's Electrical Design Guide.

C10.6 Pump Station Design

C10.6.1 A new stormwater pump station will be required at the Pembina Highway Underpass, the underpass of CN Wye Tracks, and any depressed Transitway sections.

C10.6.2 The final pump configurations will be determined in consultation with the City of Winnipeg Water and Waste Department during the Detailed Design phase. A redundant pump system for any pump stations will be required.

C10.6.3 Any proposed pump stations will consist of a wet well design utilizing suitable centrifugal type pumps and the following design elements:

(a) Handle anticipated storm water runoff area appropriately sized;

(b) Provide a total capacity to accommodate a 50 year design summer rainfall event;

(c) Vertical submersible pumps to be Flygt, ABS or equivalent;

(d) Provide high water alarm Flygt ball in wet well;

(e) Low maintenance – Graffiti resistant building with concrete exterior;

(f) Sloped metal roof;

(g) External building access to pumps with lockable hatch covers;

(h) Primary and standby power supplies (by means of one Manitoba Hydro service, and either one natural gas powered generator complete with transfer switch or a redundant Manitoba Hydro electrical service feed from an alternate grid);

(i) Provide Arc Flash Ratings for all electrical panels and switches;

(j) Provide spare space on electrical panels for future upgrades;

(k) Three phase/600 volt/60 Hz electrical distribution; Provide three phase to single phase transformer complete with single phase distribution panel;

(l) External access to wet well for clean out purposes with lockable hatch covers;

(m) Dual metal doors;

(n) Security lighting on exterior building entrance;

(o) Heating and ventilation to suit;

(p) Soft start with separate across-the-line by-pass contractors;

(q) Sediment trap;

(r) Floor in wet well shall slope towards pump intakes;

(s) Rigid pipe in wet well to facilitate cleaning by vactor equipment;

(t) Explosion proof lighting;

(u) De-watering pump in wet well sump;

(v) Wet well to be designed to match pump operations;

(w) Ventilation (heated) shall be minimum 6 ACH. Ventilation system shall provide fresh air when occupied and can use up to 75% recirculated air when unoccupied;

(x) Pump operation controls to be either Bubblers or Ultrasonic;

(y) Pump starts to be alternated;

(z) Emergency back-up lighting;

(aa) Emergency exit lights to turn on and remain on for three minutes after interior station lights are turned off;

(bb) Rising stem intake sluice gate;

(cc) Structurally rated lifting beam;

(dd) Gas detectors and environmental spill controls (if required);

(ee) Superstructure to be insulated and heated;

(ff) Metered domestic water supply equipped with backflow prevention device located above grade;

(gg) Internal hose bibs;

(hh) Paved access to site with hard surfaced parking area for minimum four vehicles;

(ii) Pump operation to be metered by hourly usage and amperage draws;

(jj) MCC on ground level in a separate electrical control room;

(kk) Local shut off switches (unless using submersible pumps);

(ll) Pump discharge to be capable of being metered and telemetered to City's SCADA system;

(mm) Telephone land line required suitable for data transmission;

(nn) Operating manual;

(oo) Rigid pipe to be installed in wet well from ground surface to bottom of the wet well to facilitate cleaning by vactor equipment;

(pp) Wet well access ladder or stairs;

(qq) Depending on station design, an electric lifting hoist appropriately rated to pump weight should be added;

(rr) RTU/Control panel to conform to standard City of Winnipeg WWS Collections materials and layout;

(ss) RTU to be a Schneider SCADAPack 334 or 357 and programmed using the Workbench software package;

(tt) With the exception of a 120V power source to the 24VDC power supply, all voltages within the RTU/Control panel to be restricted to 24VDC;

(uu) Control logic to conform to standard City of Winnipeg WWS Collections practice for pump and HVAC controls;

(vv) Pump alarms and status and station alarms are to be connected to the RTU.

(ww) Process pump alarms shall include pump fail;

(xx) Process pump status shall include, Hand, Off, Auto, Run, and Ready (where applicable);

(yy) Dewatering pump requires no instrumentation or monitoring by RTU;

(zz) Station alarms shall include fire, flood, low temperature, high temperature, power fail;

(aaa) Standby power alarms shall include generator fault and generator fail;

(bbb) Standby power status shall include generator run, generator ready, and power source (Hydro or Generator);

(ccc) Station to be capable of automated operation independent from RTU;

(ddd) Where available, analogue motor current signals and flow signals for process pumps shall be brought to the RTU as analog inputs;

(eee) RTU I/O and DNP3 register assignments to conform to City of Winnipeg WWS Collections RTU practises;

(fff) RTU register assignment table shall be submitted to the City Representative in accordance with Schedule 5 – Review Procedure;

(ggg) Analog signal isolators and IS barriers to be utilized in conformance with City of Winnipeg WWS Collections RTU practises;

(hhh) Wire colours and wire marking to conform with City of Winnipeg Identification Standard;

(iii) Electrical coordination shall be optimized to minimize the scope of any electrical fault and also to keep available arc flash energies as low as reasonably achievable;

(jjj) Electrical design shall be such that no enclosure with an arc flash rating higher than two shall be required to be serviced or switched live within any single year of normal operation and no enclosure with an arc flash rating higher than three shall be located inside a station;

(kkk) Single line diagram to be provided to City in accordance with Schedule 5 – Review Procedure;

(lll) P&ID and Loop drawings to be provide to the City Representative in accordance with Schedule 5 – Review Procedure; and

(mmm) Isometric drawings shall be provided itemizing significant inverts, instrument locations and elevations and control and alarm elevation points in meters geodetic in accordance with Schedule 5 – Review Procedure.

C10.7 Drainage Design

C10.7.1 Provide a drainage design that includes standards, specifications and design methods to be implemented during the Design and Construction with respect to proposed stormwater management facilities to meet the requirements set out in C6.4. Specific items to be addressed and ensure conformance with C10 include, but are not limited to:

(a) Storm sewers;

(b) Open ditches;

(c) Catch basins;

(d) Pump stations;

(e) Third-party drainage arrangements planned;

(f) Sub-drainage;

(g) Erosion control features;

(h) An area wide drainage plan, with pre and post Transitway and Roadway construction drainage patterns identified; and

(i) All drainage connections that tie into the City's existing land drainage system.

C10.7.2 Identify and provide details for all off site drainage arrangements that relate directly or indirectly to the Project. This includes joint use or shared facilities within the Construction Period Lands or adjacent lands.

C10.7.3 Describe the methodology and approach to be employed for the final design of the drainage facilities required for the Project.

C10.7.4 Provide the factors, parameters and assumptions used in the derivation of the design flows and other drainage analyses.

C10.7.5 Project Co will not be permitted to route additional drainage to the 1050 mm LDS along the east side of University Crescent and south side of Sifton Road that services Investors Group Field as it is for their exclusive use.

C10.8 U of M Drainage Concept

C10.8.1 A drainage concept for the U of M Southwood Lands has been developed in consultation with the U of M; see Appendix KK– U of M Land Drainage. The U of M has agreed in principal to this drainage concept, which is intended as a temporary drainage solution until the U of M moves forward with the construction of its long-term development within the U of M Southwood Lands, anticipated to proceed within the next 10 to 15 years. The intention of this concept is to provide a possible drainage solution to facilitate the completion of the Stadium Access Works by Project Co to meet the Early Access Deadline, as well as to provide a possible cost-benefit to maintain the drainage within the U of M Southwood Lands. Should Project Co utilize this concept in its design, the following will apply:

(a) Project Co is responsible for the overall design of this concept including, but not limited to, pipe sizing, pipe alignments, and pond size, subject to Schedule 5 – Review Procedure;

(b) All land drainage piping alignments need to be installed within the Lands;

(c) The U of M has agreed to the location of the pond as it matches the site of its future land drainage pond for its U of M Southwood Lands development plan;

(d) The suggested pump station drains into the existing ditch along Markham Road and discharges along this ditch to the Red River. This pumping station is temporary in nature and will be abandoned by the U of M when it has completed the construction of its long-term plans for the Southwood Lands;

(e) A fully functional pump station shall be designed that is able to operate for any rainfall event. The pump can be either electrical, gas driven, or diesel driven.

(f) If the power source is electrical, manual pumping in the event of a power failure is acceptable.

(g) This asset will be subject to the Project Agreement remaining service life criteria for similar asset classes, to a maximum of 30 years or until the University of Manitoba has carried out their development plans for the area.

(h) The land drainage sewer works and the pump station of this proposed alternative are subject to the OMR Services for the OMR Period.

C11. AT PATH DESIGN REQUIREMENTS

C11.1 The existing AT path adjacent to Stage 1 of the Southwest Transitway shall be extended along Stage 2 of the Southwest Transitway. The extended primary AT path is to have the following features:

(a) A sufficient width as outlined in Table 10 below, to accommodate commuter cyclists, recreational cyclists, wheelchair users, in-line skaters, skateboarders, and pedestrians, with a designated lane for pedestrians and wheelchair users that is separate from the lane used by other wheeled users;

(b) Connections with existing and planned paths in the active transportation network at several locations along the Transitway;

(c) Signal activation by active transportation users where the path crosses Roadways at intersections controlled by traffic signals. These crossings shall have cyclist crossing push buttons adjacent to the path to prevent cyclists from having to dismount, which shall be coordinated with the City of Winnipeg Traffic Signals Branch;

(d) Included in Transitway grade separation structures, adjacent to the northbound Transitway lane (separated from the lane by a physical barrier);

(e) Directly connected to all stations;

(f) Served by bicycle storage facilities (bike racks and lockers) at each station; and

(g) Illumination in accordance with C9.12.

C11.2 A plan of the proposed AT path and connections is shown in Figure 62 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* and is for illustrative purposes only. The final alignment of the primary AT path shall minimize impacts on existing natural features while maximizing the distance between the path and adjacent residential properties. The following features shall be included:

(a) A primary AT path shall be designed and constructed along the New Infrastructure, generally on the south and east sides of Stage 2 of the Southwest Transitway, extended from the southern end of the Stage 1 path to Markham Road with connections throughout on the north and west sides as required in the Technical Requirements;

(b) Due to safety reasons, an AT path shall not be routed through a closed Transitway tunnel. In addition, the path at the location of the Letellier Grade Separation shall be routed at-grade from Chevrier Station on the west side of the CN Letellier tracks via Chevrier Boulevard and Hudson Street. Immediately south of Hudson Street, portions of three properties will be acquired by the City to enable the path to continue further south towards Plaza Station within the Manitoba Hydro Right-of-Way on the east side of the CN Letellier rail line;

(c) Signal activation by active transportation users at path intersections with the following Roadways: Georgina Street, Clarence Avenue, Chevrier Boulevard, Chancellor Drive, Markham Road, Southpark Drive at Pembina Highway, and at University Crescent;

(d) The primary AT path will have connections to existing/planned paths and destinations in adjacent areas, including:

(i) The existing path adjacent to the Stage 1 Transitway;

(ii) An extension of the existing path on the south side of Jubilee Avenue from approximately 902 Jubilee Avenue to approximately 910 Jubilee Avenue;

(iii) Existing and planned AT paths adjacent to Pembina Highway between Jubilee Avenue and Harrow Street;

(iv) Existing sidewalks and Roadways on Rockman Street, Daniel Street, Beaumont Street, Georgina Street, and Planet Street;

(v) Existing and planned AT paths on Hurst Way, Sommerville Avenue, Seel Avenue, McGillivray Boulevard, Thomson in the Park Funeral Home and Cemetery, Waller Avenue, Pembina Highway along Chevrier Boulevard and via Plaza Drive, and on the south side of Bishop Grandin Boulevard to the Bishop Grandin Greenway and Chancellor Drive. The AT path connection along Chevrier Boulevard shall be in accordance with *Appendix TT – AT Path for Chevrier at Pembina*. The AT path connection point to Thomson in the Park Funeral Home and Cemetery shall be in accordance with *Appendix OO – Thomson Funeral Home and Cemetery AT Path Connection*;

(vi) Through existing parks to Farwell Bay and Marshall Crescent;

(vii) To Hopewell Lands as outlined in C11.9, currently owned by Hopewell Development;

(viii) Pembina Highway between Bishop Grandin Boulevard and Markham Road;

(ix) On the north side of Southpark Drive:

- Adjustments to the sidewalk and stairs may be required at 75 Southpark Drive to accommodate the new alignment of the roadway and the construction of the AT path; and
- Project Co shall review the planned design of the reconstructed Southpark Drive with the owner of the apartment block at 75 Southpark Drive at the 60% and IFC stages to determine a re-design of the steps and associated landscaping entering this apartment block, and take all necessary measures to accommodate the apartment owner's design requests for the steps and associated landscaping, all parties acting reasonably. Project Co shall keep the City informed of the discussions with the property owner and Project Co shall submit the planned design for review as per Schedule 5 – Review and Procedure.

(x) Through the U of M Southwood Lands to Investors Group Field (as shown in Figure 19 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*) including the westerly relocation of the existing fence on the west side of University Crescent between Markham Road and Investors Group Field; and

(xi) To other locations as may be determined during Detailed Design.

C11.3 The design criteria for the AT paths are shown in Table 10.

Table 10: Minimum Design Criteria for AT Paths

Category	Description	
Major Requirements	• Paths with separate lanes for cyclists and pedestrians are to have a consistent orientation of the lanes throughout the path length (assists visually impaired pedestrians to determine where to expect cyclists); • Where space permits, cyclist and pedestrian paths are to be separated by a strip of grass or other planting; • Paths are to be graded to ensure positive drainage and year-round use; • Paths are to meet all relevant accessibility and universal design standards of the City of Winnipeg; • Paths are to meet the CPTED Principles of the City of Winnipeg (access/egress design shall consider potential for user entrapment; path alignment shall provide views into and along the path); • Path intersections at Transitways and Roadways should be at right angles and provide clear sight lines between motorists and pedestrians/cyclists; • Access control barriers (to prevent vehicular access) and speed control measures for cyclists are to be provided where paths intersect with Transitways and Roadways; • Traffic signage for cyclists are to be provided by City of Winnipeg Traffic Services outside of this project; • Connection paths are to cross the Transitway only at stations and at controlled intersections; • Shared rest spots and benches should be provided with priority given to AT path intersections at the following locations: – Between the Pembina Underpass and Parker Station; – Between Parker Station and McGillivray Station; – Between Chevrier Station and Plaza Station south of Hudson Street; – Between Chancellor Station and Markham Station; and – A minimum of one in the Southwood Lands. • Paths are to be lit by Transitway street lights and, where necessary, by additional dedicated path lighting; and • Paths are to support operation of City maintenance vehicles.	
Characteristics	Primary Divided AT path	
	Total Path Width (Where the cycle and walking facility have no separation. Where separation occurs, the separation width will be in addition to this width)	4.5 m
	Width of Pedestrian Portion	1.4 m
	Width of Cycling Portion	2.9 m
	Width of Rumble Strip (where space does not permit dividing strip or planted material) with a Painted Solid Line (to delineate pedestrian and cyclists)	0.2 m

Category	Description	
	Width of Dividing Strip of Grass or Planted Material (where space permits)	1.0 m
	Painted Dashed Center Yellow Line on Cyclist Portion (to separate bi-directional traffic flow).	Yes
	Multi-Use Connection Pathways to Existing Sidewalks and Streets	
	Total Path Width	3.5 m
	Painted Dashed Center Yellow Line to Delineate Direction of Travel	Yes
	Chevrier Boulevard (see *Appendix TT – AT Path for Chevrier at Pembina*)	
	Width of Sidewalk (North)	1.5 m
	Width of Cycling Portion (On Street)	1.5 m
	Width of Buffer for Cycling Portion (On Street)	0.6 m
	Total Path Width (south side of Chevrier Boulevard approximately 120 m west of Pembina Highway to Pembina Highway)	3.6 m
	Painted Dashed Center Yellow Line to Delineate Direction of Travel	Yes
	Southpark Drive Complete Street (see Figure 13 for cross-section)	
	Total Path Width	4.5 m
	Width of Pedestrian Portion	1.4 m
	Width of Cycling Portion	2.9 m
	Width of Rumble Strip	0.2 m
	Painted Centre Yellow Line on Cyclist Portion	Yes
	Width of Concrete Sidewalk and Platform at Transit Stops	Between Property Line and Curb

C11.4 In areas where the cycle and walking facility have no separation, a rumble strip as described below shall be installed with a painted line on the cyclist portion adjacent to the rumble strip in accordance with C17.2(e). Project Co is to ensure that the forming of the rumble strip does not adversely affect the strength or quality of the paving or snow removal.

C11.4.1 The rumble strip shall be 200 mm wide and shall have grooves with a spacing of 50 mm apart. The grooves shall be 6 mm in depth and have a surface width of 6 mm. The rumble strip shall not be counted within the minimum widths of the pavement for the AT path.

C11.5 The AT path between Plaza Station and the Transitway Bridge over Bishop Grandin will be a joint use path located immediately adjacent to a revised vehicular access to the existing pump station for the existing Bishop Grandin Underpass of Pembina Highway. The access road to the pump station shall be built to a standard that can accommodate light trucks and can have a granular surface.

C11.6 Improvements to the pedestrian and active transportation facilities adjacent to Pembina Highway between Point Road and Stafford Road, through the use of sidewalks, bi-directional, uni-directional, and multi-use AT paths, shall be designed in accordance with *Appendix JJ – AT Path Functional Design – Pembina Highway at Jubilee Avenue.*

C11.7 In areas where the cycle and walking facilities are separated by a dividing strip of grass or planted material, the pedestrian path shall be 1.5 m wide and the cycling path shall be 3.0 m wide.

C11.8 New AT path at-grade crossings of CN will not be permitted with the exception of the at-grade AT Path Connection to Hopewell Lands. The existing AT path at-grade crossing of CN between Parker Avenue and Byng Place will remain.

C11.9 The following design criteria shall be followed for the AT path Design and Construction:

(a) Designed to accommodate the loading of a Manitoba Hydro bucket truck as this vehicle will be used by Manitoba Hydro to maintain the lighting along the path;

(b) Design speed of 35 km/hr;

(c) Stopping sight distance of 35 m;

(d) Sizing of through passes shall be a minimum of 3.0 m high and 6.0 m wide;

(e) A 0.5 m shy distance will be required where the AT path is adjacent to a fixed barrier or wall, excluding the AT path on grade separation structures as noted in C11.1(d);

(i) For the Pembina Highway Underpass, provided a fixed wall or barrier such as a retaining wall or bridge pedestrian handrail is continuous along the entire length of the Pembina Highway Underpass, there is not a requirement to provide a 0.5 m shy. Any obstructions such as piers or other components that are discontinuous for the length of the Pembina Highway Underpass will require a 0.5 m shy.

(ii) For the AT path along the CN Letellier subdivision, south of Bishop Grandin Boulevard, a 0.5 m shy is not required for any roadway barriers or fencing that is continuous along the length of the AT path.

(f) Any stairways shall include a bike trough; and

(g) AT path distances to the edge of a cut or fill slope shall be a minimum of 0.9 m.

(h) A longitudinal gradient of 3% or less shall be used for at least 40 m in advance of a junction, intersection, or abrupt change in direction.

(i) An AT path with retaining walls on both sides of the path and within 6.0 m from face to face, with wall heights greater than 2.5 m in height, shall be considered a tunnel and therefore C11.9(d) will apply.

C11.10 Adjacent to Markham Station on the east side of the station, the AT path may be reduced to 3.5 m in width, to accommodate C9.3.1(a). However this reduction shall be minimized in the design.

C11.11 The Design and Construction of the Transitway Overpass of McGillivray Boulevard shall take into account the future AT path, offsets, and clear zones, proposed to be running east-west on the north side of McGillivray Boulevard as shown in Figure 62 in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*.

C11.12 Design and Construction of the AT path connection along Hurst Way from the Parker Station to the Hurst Way tie in, east of Waverley Street, shall be in accordance with the design parameters of C11 and tie into the existing sidewalk on the north side of Hurst Way at the east approach to the Humane Society.

C12. AT PATH CONNECTION TO HOPEWELL LANDS

C12.1 Background

C12.1.1 Hopewell Development is planning a new transit oriented development on lands it owns ("Hopewell Lands") west of the CN Letellier track opposite Plaza Station. An at-grade pedestrian and cyclist connection between Hopewell Lands and Plaza Station is required.

C12.1.2 The existing CN Letellier rail line is located between the Hopewell Lands and the Stage 2 Transitway. CN will permit an at-grade pedestrian/cycling crossing of its rail line at this location.

C12.1.3 Due to potential conflicts with planned transmission towers, Manitoba Hydro will not permit an elevated grade separated pedestrian/cycling crossing of the rail line in the vicinity of Plaza Station.

C12.1.4 A 1650 mm main branch aqueduct is located in the Manitoba Hydro Right-of-Way west of the CN Letellier subdivision. A 750 mm pressurized feedermain is located west of the CN Letellier subdivision. These two lines can only be taken out of service during low consumption times and any relocation can only take place within a very narrow time slot. Lowering of these lines is not preferred by the City of Winnipeg Water and Waste Department.

C12.2 Design

C12.2.1 An at-grade connection shall be designed to provide pedestrian and cyclist access from Plaza Station to the west side of the CN Letellier subdivision. This is anticipated to include an at-grade crossing of the new Transitway and the CN Letellier rail line. This connection needs to be as open and visible as possible to provide a level of comfort and safety to the users, and as direct as possible to minimize travel distance in order to encourage walking

and cycling to/from Plaza Station. The design of this connection shall be submitted for review in accordance with Schedule 5 – Review Procedure. The design of the connection shall be submitted to CN for approval as outlined in C23.4.2.

C12.2.2 To prevent access to the rail track and as referenced in C9.13, adequate fencing shall be constructed to minimize access to the CN Right-of-Way from this active transportation connection. Project Co shall determine in conjunction with CN the limits of the fencing in this area and their setback from the signalized crossing of the CN Letellier rail line.

C12.2.3 Project Co is to consider the following in their design and approvals:

(a) Safety of the pedestrian and cyclist is paramount;

(b) All design codes and guidelines pertaining to accessibility, CPTED, universal design, sight distances, etc. shall be adhered to;

(c) The connection needs to be economically feasible and needs to minimize OMR Services requirements; and

(d) CN signalization of the at-grade crossing in accordance with C23.13.1.

C12.2.4 All Permits, Licences and Approvals required for the active transportation connection to Hopewell Lands shall be obtained by Project Co from, but not limited to: CN, Manitoba Hydro, Water and Waste Department, Transit Department and other City Departments.

C12.2.5 The at-grade crossing of the CN Letellier rail line shall be sited to provide convenient access to/from Plaza Station on the east side of the track and at a sufficient distance from the Lot 16 Drain on the west side of the track to discourage pedestrian activity at the entrance of the Lot 16 Drain to the drain's enclosed channel.

C12.2.6 The at-grade crossing connection for the AT path shall tie into the south end of the Plaza Station in line with the crossing of the Transitway.

C12.3 Construction

C12.3.1 Construction within the CN Letellier subdivision shall follow Appendix H – CN Guidelines and those outlined within the Technical Requirements. In the event of conflict or ambiguity between Appendix H – CN Guidelines and the Technical Requirements, the Parties may refer the matter to the Independent Certifier in accordance with Schedule 5 – Review Procedure.

C12.3.2 Upon completion of the at-grade separation, Project Co shall close and block off the active transportation facility until it is required for its intended use. (This is anticipated to occur when Hopewell Development has completed construction of the AT path within its development from the west and its access to the at-grade separated crossing, and has requested, in writing, that the City make the at-grade separation crossing available for use.)

C13. BRENDA LEIPSIC DOG PARK

C13.1 The existing Brenda Leipsic Dog Park is approximately 32 acres in size and is located north of Parker Avenue between Hurst Way and Daniel Street. An unimproved area at the west end of the Brenda Leipsic Dog Park, accessed from Hurst Way, is used for vehicle parking by dog owners.

C13.2 As the alignment for Stage 2 of the Transitway traverses through the existing Brenda Leipsic Dog Park, a reconfiguration of it will be necessary. A reconfiguration (with a comparison to the limits of the existing Brenda Leipsic Dog Park) is shown in *Appendix II – Proposed Brenda Leipsic Dog Park.*

C13.3 The reconfigured option, approximately 14.5 acres in size, is to be located to the west and to the north of the Transitway between Edderton Avenue/Willson Place and Georgina Street (in the area between McGillivray Station and Parker Station) and is to feature:

(a) Perimeter chain-link (1.5 m high) fencing of the reconfigured dog park;

(b) A dedicated right-in/right-out and vehicular approach from Hurst Way at the north-west corner of the planned dog park;

(c) A designated asphalt access road and parking lot for 25 cars including line painting and with appropriate illumination;

(d) A grated service vehicle entrance from the planned easterly extension on Hurst Way;

(e) A limestone pedestrian path, 3.0 m in width, throughout the dog park;

(f) Dog park pedestrian path connectivity to the Transitway AT path system at the easternmost end of the dog park and the southernmost end of the dog park;

(g) Gates for pedestrians to enter/exit the dog park including:

(i) South end of parking lot;

(ii) West side of the dog park connecting to the planned Hurst Way sidewalk (north of parking lot);

(iii) East side of the dog park connecting to the Transitway AT path; and

(iv) South side of the dog park connecting to the Transitway AT path.

(h) Three in-ground waste receptacles located throughout the dog park;

(i) Five picnic tables located throughout the dog park;

(j) A 10' by 10' wood storage shed along the west perimeter fence of the dog park;

(k) A wooden shaded shelter (floor, posts, and roof with no walls) south of the parking lot with a minimum roof area of 18 $m^{2;}$

(l) Low growing turf throughout the dog park with existing vegetation preserved;

(m) Low berms (Project Co to obtain Permits, Licences and Approvals from Manitoba Hydro prior to construction of low berms); and

(n) A bulletin board/signage for the dog park will be provided by the Dog Park Association and is not part of the requirements by Project Co.

C13.4 During Detailed Design for the Transitway, further discussions with the Parks and Open Space Division of the City's Public Works Department and with Manitoba Hydro may be necessary to determine design and construction requirements for the reconfigured area for such items as fence heights, access, clearances, waste receptacles locations, location of berms, existing and proposed painting, etc.

C13.5 Appropriate grading shall be in place for the Brenda Leipsic Dog Park to ensure positive drainage is in place to prevent standing water throughout the dog park.

C14. DESIGN AND OPERATION REQUIREMENTS IN CLOSE PROXIMITY TO LARGE DIAMETER PIPELINES

C14.1 This section details the Design and Construction of New Infrastructure in close proximity to large diameter pipelines including, but not limited to: the Branch II Aqueduct, Fort Garry-St. Vital (FGSV) Feedermain, Fort Garry Feedermain, and 1500 by-pass piping (which shall be treated as aqueduct piping). The Branch II Aqueduct, FGSV Feedermain, and the 1500 by-pass piping are critical components of the City of Winnipeg Regional Water Supply System and work in close proximity to the pipeline shall be undertaken with an abundance of caution.

C14.2 Project Co shall ensure all pipelines and any Related Infrastructure is adequately protected from both long-term and short-term damage due to the Design and Construction of the New Infrastructure.

C14.3 Aqueduct and feedermain shutdowns are scheduled based on a number of factors including water demand, weather, reservoir operation, routine maintenance, repair work within the regional distribution system, and other factors. Should a shutdown be required, the City shall endeavour to make the specified time periods available to Project Co without limiting the City's control over the operation of the regional water system, ability to complete City Work, maintain adequate water supply and storage of water and maintain the integrity of the infrastructure. The City shall reserve the right to cancel and/or delay these schedule dates at any time, due to any circumstances that could adversely affect the pipeline or water supply including, but not limited to,

high water demand, abnormal weather, failure of related water system components, and/or security concerns.

C14.4 Branch II Aqueduct shutdowns are typically restricted to times between September 15 and May 15, corresponding to the lower demand season. However, short duration shutdowns may be permitted based on lower demands and current system operation. Providing advanced notice of anticipated Branch II Aqueduct shutdowns is required.

C14.5 Temporary or short-term feedermain shutdowns may be scheduled to complete short duration work. They may be limited to off-peak period demand times including evenings. Durations of temporary shutdowns will be demand dependant and if multiple shutdowns are required, they may be scheduled for successive days.

C14.6 In areas where construction needs to take place above a feedermain or aqueduct, vibratory compaction will not be permitted. In addition, the loading assessment report found in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* shall be followed for permissible construction activities. The loading assessment report within the aforementioned report includes the Branch II Aqueduct as-built information.

C14.7 Any manholes, aqueduct access points, and bungalow buildings belonging to the feedermain or aqueduct currently existing in the Manitoba Hydro Right-of-Way shall be protected during construction. If they terminate within a parking lot or Park and Ride facility, they shall be protected by steel bollards. In addition, any bungalow building in a parking lot or Park and Ride facility shall be provided with two reserved parking stalls for City of Winnipeg Water and Waste Department adjacent to the building and 24 hour full access be maintained to the building at all times.

C14.8 For any new crossings of the Branch II Aqueduct, Fort Garry-St. Vital (FGSV) Feedermain, Fort Garry Feedermain, 1500 by-pass piping, Lot 16 Drain, or any other aqueducts or feedermains, by permanent or temporary Roadways, Transitways, Rail Work or other New Infrastructure, adequate protection to accommodate the loading at these crossings, or relocation, shall be designed and constructed.

C14.9 Project Co is advised to use caution regarding Design and Construction that may impact the thrust block on the Branch II Aqueduct in this area.

C14.10 The Lot 16 Drain is a major flood drain for the City of Winnipeg and construction will only be permitted on it between November 15 and March 15 of any given year.

C14.11 Any requests with respect to the Lot 16 Drain regarding a shutdown, cutover, equipment crossing or construction in close proximity shall be made to the City of Winnipeg Water and Waste Department in writing with drawings attached that describe and depict the work taking place. This submission shall be made to the Water and Waste Department Senior Design and Contract Engineer, currently held by Kas Zurek (204-986-2025 or kzurek@winnipeg.ca). Project Co shall contact the Water and Waste Department for any required Permits, Licenses and Approvals, which shall be obtained prior to the commencement of any activities near the Lot 16 Drain.

C14.12 Any requests with respect to the feedermain or aqueduct regarding a shutdown, equipment crossing or construction in close proximity shall be made to the City of Winnipeg Water and Waste Department in writing with drawings attached that describe and depict the work taking place. This submission shall be made to the City's feedermain and aqueduct specialist, currently held by Ron Sorokowski (204-986-4472 or rsorokowski@winnipeg.ca). Project Co shall contact the Water and Waste Department for any required Permits, Licenses and Approvals, which shall be obtained prior to the commencement of any activities near the feedermain or aqueduct.

C14.13 Further to C14.12, the 1500 by-pass piping located on the south side of Reservoir No. 1 of the Hurst Pumping Station and immediately north of Willson Place may require a loading assessment to be completed on it to determine the structural bridging requirements, permissible equipment crossing, and construction requirements in close proximity to this line. This loading assessment and required protection will be the responsibility of Project Co.

C15. PROVISIONS FOR FUTURE EXPANSION

C15.1 During Design and Construction, Project Co shall be cognizant of the possibility of future expansion through the addition of lanes or other elements. This shall be considered at the following locations:

(a) Transitway through the University of Manitoba's Southwood lands from Pembina Highway to University Crescent; and

(b) For the Transitway Overpass of McGillivray Boulevard, the Transitway Bridge over Bishop Grandin, and the CN Letellier Rail Bridge over Bishop Grandin Boulevard, the design of these structures shall consider possible future widenings of the Roadways beneath them.

C15.2 During design of the bridge structures, Project Co shall be cognizant of the potential requirement for future widening and/or lengthening of the bridge structures or the addition of lanes to the Roadways beneath them. When required, the initial Design and Construction of the bridge structures shall consider provisions that feasibly allow for future economical bridge structure widening and/or lengthening.

C15.3 Vertical grade lines shall be set so that all vertical clearance requirements are met after any anticipated bridge structure widening and/or lengthening or Roadway rehabilitation has occurred.

C15.4 Provisions shall be undertaken for the potential future widening of Bishop Grandin Boulevard. Future expansion shall be on the inside of the roadway.

C15.5 The Design and Construction for the future expansion of Bishop Grandin Boulevard shall be taken to mean the addition of an eastbound and westbound lane towards the median beside the existing median lanes.

C16. TRANSITWAY AND ROADWAY TRANSPORTATION SAFETY AUDITS

C16.1 A Transitway and Roadway transportation safety audit shall be performed on all New Infrastructure by personnel at arm's length from and completely independent of Project Co and any entity carrying out any design or design checking work for the Project at Project Co's cost.

C16.2 Transportation safety audits shall follow the TAC work scope detailed in the Canadian Road Safety Audit Guide, for both design and pre-opening stages. The pre-opening transportation safety audit shall be conducted after the Transitway and Roadways are paved and all signage and pavement markings are complete. Transportation safety audits shall be an integral part of the QMS.

C16.3 At the completion of each of the design and pre-opening transportation safety audits, and as soon as practicable, Project Co shall:

C16.3.1 Prepare and submit a report responding to the safety audit recommendations and suggestions;

C16.3.2 Implement, at its cost, the recommendations or suggestions determined by the independent safety auditor, acting reasonably;

C16.3.3 Provide the City with a written explanation as to the recommendations or suggestions Project Co has decided not to implement; and

C16.3.4 Implement or shall refrain from implementing, at its cost, those recommendations or suggestions as directed in writing by the City in accordance with Schedule 5 – Review Procedure.

C17. TRANSIT AND TRAFFIC OPERATIONAL REQUIREMENTS

C17.1 Project Co will be required to arrange for and coordinate the following operational requirements to be provided by City of Winnipeg departments. In addition, Project Co will also bear all costs for the following work, except for the items by the City of Winnipeg Transit Department listed in C17.1.3:

C17.1.1 City of Winnipeg Traffic Signals Branch

(a) The Traffic Signals Branch of the Public Works Department may be required to upgrade or re-time (permanently or temporarily during construction) existing traffic signals at the following intersections:

(i) Pembina Highway and Jubilee Avenue;

(ii) Pembina Highway and Stafford Street;

(iii) Stafford Street and Taylor Avenue;

(iv) Hurst Way at Waverley Street (east leg); and

(v) Markham Road and Pembina Highway.

(b) The Traffic Signals Branch of the Public Works Department will be required to design and install new traffic signals at the following intersections:

(i) Georgina Street and Transitway;

(ii) Clarence Avenue and Transitway;

(iii) Chevrier Boulevard and Transitway;

(iv) Southpark Drive and Pembina Highway;

(v) University Crescent and Transitway; and,

(vi) Pembina Highway and Merriam Boulevard (half signal).

(c) CN Signals Department and the Traffic Signals Branch of the Public Works Department will be required to design, integrate, and implement CN crossing signals and traffic signals for rapid transit service at the following intersections adjacent to the CN Letellier subdivision:

(i) Transitway and Chancellor Drive; and

(ii) Transitway and Markham Road.

(d) The Traffic Signals Branch of the Public Works Department may be required to design, integrate, and install new cycle crossing signal activation at AT path intersections with at-grade Roadway crossings, if necessary.

(e) The Traffic Signals Branch of the Public Works Department and the Transit Department will be required to design, integrate, and implement transit signal actuation for rapid transit service at Transitway intersections with the following Roadways: Georgina Street, Clarence Avenue, Chevrier Boulevard, Chancellor Drive, Markham Road, Southpark Drive at Pembina Highway, at intersections in the U of M Southwood Lands, and at University Crescent. Project Co will be required to coordinate the installation of signal detector loops under the pavement in all directions at these intersections.

(f) Changes to signal timing may be initiated by Project Co or the City of Winnipeg. Project Co shall communicate with City of Winnipeg Traffic Signals Branch to ensure that all signals are built and installed, relocated, or adjusted according to the Design and Construction Schedule.

(g) The signal locations listed in C17.1.1(b)(iv) and C17.1.1(b)(vi) shall allow a cyclist to cross without dismounting, legally in accordance with the Highway Traffic Act. This means a separate crossing for cyclist/pedestrians may be required with a bicycle signal head.

C17.1.2 City of Winnipeg Traffic Services Department

(a) The Traffic Services Department of the Public Works Department will be required to provide temporary directional, regulatory, warning, and guide and information signage (in accordance with Appendix W – Manual of Temporary Traffic Control on City Streets, City of Winnipeg (2015)) during construction for temporary traffic detours/lane closures.

(b) Project Co will be required to fabricate Infrastructure signs in accordance with D5.

(c) The Traffic Services Department of the Public Works Department will be required to provide permanent regulatory and warning signage (in accordance with MUTCD Canada) on the Transitway, at Transitway connections with Roadways, at bus

access/egress locations on the Transitway, Roadways, and for closures/realignments of Existing Infrastructure.

(d) The Traffic Services Department of the Public Works Department will be required to provide Transitway location signage and intersection location signage on the Transitway and at Transitway connections with Roadways.

(e) E.g., Location Signage Intersection Signage

(f) The City of Winnipeg Public Works Department plans to undertake, as a separate initiative, the design of identification and wayfinding signs for Winnipeg's active transportation network. Signage standards developed by this initiative will be installed by the Traffic Services Department for the active transportation facilities included in the Project.

C17.1.3 City of Winnipeg Transit Department

(a) The Transit Department will be required to supply and install of the Transitway's electronic BUSwatch signs with the existing system.

(b) The Transit Department will assume responsibility for the design and implementation of any future bus operations message display system on the Transitway.

(c) The appropriate City departments, through the guidance of the Transit Department, will assume responsibility for the design, integration, and implementation of any future CCTV system and signage on the Transitway.

C17.2 Project Co shall complete the following operational requirements:

(a) Project Co will be required to provide temporary conditions signage for temporary traffic detours/lane closures in accordance with C18;

(b) Project Co will be required to coordinate overhead sign structures with the Traffic Services Department in accordance with C17.1.2;

(c) Project Co will be required to install infrastructure signs in accordance with D5;

(d) Project Co will be required to install northbound/southbound signage on median fence and wayfinding signage in accordance with Item 22 and 23 respectively in Table 6: Station Design Elements found in C9;

(e) Project Co will be required to provide line painting and/or permanent markings on the Transitway, in the stations, Park and Ride facilities, on Roadways, all parking lots, on the AT path, and on all other applicable New Infrastructure within the Project; and

(f) Project Co shall coordinate, supply and install all conduit and power requirements for Traffic Services, Traffic Signals and Transit as needed for the work described in this section, in addition to the communication conduit described in C6.7.13.

(g) During the Reconstruction of any Roadways with existing transit stops, Project Co shall coordinate the temporary relocation of any transit stops and/or shelters to accommodate transit users during construction.

C18. TRAFFIC MANAGEMENT

C18.1 Project Co shall design a Traffic Management Plan that most effectively balances the cost of the Project and the impact on traffic during construction.

C18.2 Within the Traffic Management Plan and with relevant drawings, Project Co shall describe how it will maintain the safe and efficient passage of Infrastructure Users through the Construction Period in accordance with the latest edition of the *Manual of Temporary Traffic Control on City Streets (2015).* The following locations shall be included:

(a) Pembina Highway Underpass;

(b) Bishop Grandin Underpass; and

(c) On Existing Infrastructure intersecting with the Transitway or affected by Transitway construction including, but not limited to:

(i) Parker Avenue;
(ii) Hurst Way;
(iii) Edderton Avenue;
(iv) Seel Avenue;
(v) McGillivray Boulevard;
(vi) Waller Avenue;
(vii) Clarence Avenue;
(viii) Chevrier Boulevard;
(ix) French Street;
(x) Chancellor Drive;
(xi) Southpark Drive;
(xii) Markham Road;
(xiii) Pembina Highway;
(xiv) University Crescent; and
(xv) Dafoe Road.

C18.3 The Traffic Management Plan shall include the following plans:

(a) Traffic management of temporary construction;

(b) Permanent signage; and

(c) Line painting and/or permanent markings.

C18.3.1 Traffic Management of Temporary Construction

(a) Traffic management of temporary construction shall include plans showing the type and location of temporary construction signage during the various stages of Design and Construction for each location where temporary construction signage is required. The plans shall minimize all potential neighbourhood shortcutting.

(b) Traffic management of temporary construction shall include plans showing the routes and number of open lanes of construction traffic during the various stages of Design and Construction for each location where construction traffic will access and egress the sites.

(c) The plans shall be submitted in accordance with Schedule 5 – Review and Procedure two weeks in advance of any construction work taking place. Changes to previously reviewed plans shall be re-submitted in accordance with Schedule 5 – Review and Procedure for review by the Traffic Management Branch according to the following:

(i) For changes involving full or directional closures one week in advance of any construction work taking place;

(ii) For all other changes, 72 hours in advance of any construction work taking place.

(d) All barricades, signage, variable message signs (VMS), etc. according to the approved plans will be supplied, placed, maintained, and removed by Project Co, with all costs borne by Project Co. Temporary directional, regulatory, and warning signage as defined in the Manual of Uniform Traffic Control Devices Canada, MUTCD Canada, except the Keep Right (RB-25) and Keep Left (RB-25L) signs, will be placed by City of Winnipeg Traffic Services, and invoiced to Project Co.

C18.3.2 Permanent Signage

(a) Two months in advance of the placement of the permanent signage of the Project, Project Co shall submit plans in accordance with Schedule 5 – Review and Procedure showing the type and location of all permanent signage for the Project.

City of Winnipeg Traffic Services will supply, place, and maintain signage as described in C17.1.2 and invoice Project Co.

C18.3.3 Line Painting and/or Permanent Markings

(a) Two months in advance of the placement of the line painting and/or permanent markings on the Project, Project Co shall submit plans in accordance with Schedule 5 – Review and Procedure showing the type, dimensions, colour and location of all line painting and/or permanent markings for the Project. Project Co will supply and place all line painting and/or permanent markings, and will maintain all line painting and/or permanent markings except as listed in E1.9.7(a).

C18.4 Traffic Control

C18.4.1 General

(a) The Traffic Management Plan shall include all operations related to establishing and executing access and traffic control for the New Infrastructure as hereinafter specified.

(b) Access to the residences and businesses shall be maintained at all times. Should Project Co be unable to maintain an existing access to a residence or business, Project Co shall review the planned disruption with the business or residence, and take reasonable measures to minimize the impact. Project Co shall provide a minimum of 24 hours notification to the affected residence or business, prior to disruption of access. Project Co shall keep the City informed of the discussions with residences and businesses regarding their accesses.

(i) Access to the businesses at 555 Hervo Street, Winnipeg shall be maintained at all times. Should Project Co be unable to maintain the existing access to said businesses, Project Co shall review the planned disruption to the existing access with the owner of 555 Hervo Street, and take all necessary measures to arrange a suitable alternate access route, all parties acting reasonably. Project Co shall provide a minimum of 72 hours notification to the owner of 555 Hervo Street, prior to disruption of the existing access route. Project Co shall keep the City informed of the discussions with the business owner and will review the planned disruption to the access as per Schedule 5 – Review Procedure.

(ii) Project Co shall ensure that access to the land north of the Manitoba Hydro Right-of-Way along the extension of Hurst Way from the existing Parker Avenue to Georgina Street can be obtained, should the owner of this land require it during Design and Construction.

(c) Where left turn lanes exist, an additional lane to accommodate the left turn storage lane shall be maintained at all times.

(d) Traffic at intersecting Roadways and private approaches shall be maintained at all times.

(e) Project Co shall notify the City of Winnipeg Traffic Management Branch via the online closure request form (Winnipeg.ca/publicworks/Contact) 72 hours in advance of any Lane Closures.

(f) For traffic control, Project Co shall erect and maintain all applicable traffic control devices in accordance with the provision contained in the latest edition of the Manual of Temporary Traffic Control on City Streets (2015), issued by the City of Winnipeg and in accordance with Project Co's Traffic Management Plan.

(g) Project Co shall provide and maintain flagmen in accordance with the above-mentioned manual as necessary.

(h) Project Co shall take all other safety measures necessary to cope with any peculiar or unusual circumstances that have not been set out in the above-mentioned manual and shall, at all times, ensure that maximum protection is afforded to Infrastructure Users within the limits of the contract and that their operations in no way interfere with the safe operation of traffic.

(i) Barricades supplied and installed by Project Co shall show the name of Project Co, or its Project Co Party in charge of that aspect of the New Infrastructure, and their telephone number(s) at which it can be reached 24 hours per day, seven days per week.

(j) During the hours when Project Co is not working, equipment and stockpiled materials shall be left in such a location so as not to interfere with or present a hazard to motorists or pedestrians.

(k) Temporary ramping of pavements and ramp curbs shall be maintained in asphalt.

(l) Pedestrian passage shall be maintained in a safe manner.

(m) Transit and ambulance/emergency vehicle access shall be maintained at all times on Existing Infrastructure and through the Construction Period Lands.

(n) Project Co shall remove any lane closures to allow full lane usage when no work is being undertaken and the closures are not required, so as to limit the number of days a lane reduction exists.

(o) One lane of pedestrian access shall be maintained at all times on all Existing Infrastructure where pre-existing pedestrian access exists, including at the Pembina Highway Underpass and Bishop Grandin Underpass at the CN Letellier subdivision. Where pedestrian access cannot be maintained due to construction activities, Project Co shall provide an alternative solution for pedestrians to pass through the site which may include temporary ramp curbs or shuttles, subject to review in accordance with Schedule 5 – Review and Procedure.

C18.4.2 Pembina Highway Underpass

(a) Pembina Highway Underpass currently has three lanes of traffic in the southbound direction and two lanes in the northbound direction. Throughout the construction of the New Infrastructure, Project Co will be required to maintain traffic as outlined below.

(b) A minimum of two northbound and two southbound lanes of traffic shall be maintained at all times between 06:00 and 22:00.

(c) A minimum of three lanes of traffic on northbound and southbound Pembina (two lanes in one direction and one lane in the opposite direction) during construction between 22:00 and 06:00 shall be maintained.

(d) A Four Lane Week means a Monday to a Sunday or a portion thereof, during the Construction Period when there is a traffic disruption reducing lane availability to a minimum of four lanes (two northbound and two southbound) approaching and disembarking from and on Pembina Highway between Point Road and Stafford Street, between the hours of 06:00 to 22:00.

(e) During the Construction Period, Project Co's actual performance relative to its Traffic Management Plan and Four Lane Weeks Schedule will be subject to monitoring. If Project Co's Actual Total Four Lane Weeks during the Construction Period exceeds the Target Total Four Lane Weeks, Project Co shall be assessed a Traffic Management Payment Adjustment for each additional Four Lane Week. Full details of the Traffic Management Payment Adjustment are set out in Schedule 13 – Traffic Management.

(f) A maximum of [redacted] Four Lane Weeks of traffic disruption on Pembina Highway throughout construction of Pembina Highway from Point Road to Stafford Street.
18(1)(c)(i)(ii)(iii) Project Co shall identify in the Traffic Management Plan when the [redacted] Four Lane Weeks are scheduled to take place. During the period outside the [redacted] Four Lane Weeks either five or six lanes shall be open between 06:00 and 22:00.

(g) Full Roadway Closure

(i) Up to two weekend closures of the roadway between Jubilee Avenue and Stafford Street for each of the CN Rail Bridge over Pembina Highway and the Transitway Bridge over Pembina Highway (for a total of four closures), through the respected construction areas between Friday 20:00 and Monday

04:00 will be permitted for the erection of girders, with the following provisions:

- Two weeks' notice to the City shall be provided;
- Two major regional streets will not be permitted to be closed at the same time. This may include a roadway on a project outside the scope of this Project. Therefore coordination with the City is imperative; and
- A 4 m opening for the passage of emergency vehicles and buses will be available at all times for use in both directions. Winnipeg Transit will provide assistance in managing the passage of their vehicles through the construction area and allow minor delays as determined necessary while girders are being erected, with the goal providing continued operation of this bus route.

(ii) A fifth weekend closure of the roadway between Jubilee Avenue and Stafford Street for the CN Rail Bridge over Pembina Highway through the construction area between Friday 20:00 and Monday 04:00 will be permitted for the demolition of the existing structure, with the following provisions:

- Two weeks' notice to the City will be provided;
- Two major regional streets will not be permitted to be closed at the same time. This may include a roadway on a project outside the scope of this Project. Therefore coordination with the City is imperative; and
- A 4 m opening for the passage of emergency vehicles and buses will be available at all times. Winnipeg Transit will provide assistance in managing the passage of their vehicles through the construction area and allow minor delays as determined necessary demolition is taking place, with the goal providing continued operation of this bus route.

(iii) Additional weekend closures of the roadway between Jubilee Avenue and Stafford Street for each of the CN Rail Bridge over Pembina Highway and the Transitway Bridge over Pembina Highway through the construction area between Friday 20:00 and Monday 04:00 will be permitted with the same provisions as above. Failure to meet these requirements will be subject to a Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

(h) In accordance with the Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65), one left turn lane on the northbound lanes of Pembina Highway at Stafford Street shall be maintained at all times. During this reduction, consideration shall be given to the removal of the left turn lane from northbound Stafford to Taylor in consultation with the City of Winnipeg Traffic Management Branch.

(i) One lane of pedestrian access shall be maintained at all times through the Pembina Highway Underpass. Where pedestrian access cannot be maintained due to construction activities, Project Co shall provide an alternative solution for pedestrians to pass through the site which may include temporary ramp curbs or shuttles, subject to Traffic Management Branch review. Failure to meet these requirements will be subject to a Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

C18.4.3 Jubilee Ramp

(a) One lane of traffic in either direction shall be maintained on the Jubilee Ramp at all times, except as described below.

(b) Full Roadway closure:

(i) During the construction of the AT Path Connection at Pembina, a combined closure of the two loops will be permitted for no more than one period of nine consecutive days in the months of July and/or August, of which the first day shall be a Saturday and the ninth day shall be a Sunday. Within the Traffic Management Plan, Project Co shall provide alternate routes for Transitway Stage 1 buses to proceed to Pembina Highway southbound during this operation. Should the closure last longer than nine consecutive days, Project Co will be subject to Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management. This closure outlined above for the Jubilee ramps shall supersede the traffic staging for this work outlined in the *Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65)*.

C18.4.4 Parker Avenue and Hurst Way

(a) During the Design and Construction of the Transitway, Parker Avenue, and Hurst Way, one lane of traffic in each direction between Parker Avenue and Waverley Street shall be maintained at all times.

C18.4.5 McGillivray Boulevard

(a) McGillivray Boulevard currently has two lanes of traffic in the eastbound direction and two lanes in the westbound direction. Throughout the construction of the Transitway Overpass of McGillivray Boulevard, Project Co will be required to maintain traffic as outlined below:

(i) A minimum of two eastbound and two westbound lanes of traffic shall be maintained at all times between 06:00 and 18:30 from Monday to Friday;

(ii) A minimum of one eastbound and one westbound lanes of traffic shall be maintained at all times between 18:30 and 06:00 from Monday to Friday, and on weekends form Friday at 18:30 to Monday at 06:00;

(iii) Closure of two lanes in a single direction:

- Closure of two lanes in a single direction will be permitted to take place with acceptable notice provided to the City of Winnipeg;
- The construction of cross-overs will remove traffic on two adjacent lanes in a similar direction, allowing them to be closed through the construction area, resulting in one lane of traffic in each direction operating on one side of the median. This will only be permitted between Friday at 18:30 and Monday at 06:00, and for up to 30 days that fall between Monday at 06:00 and Friday at 18:30; and
- Should Project Co have more than 30 days of closure with two lanes in a single direction or require a full weekend closure of McGillivray Boulevard at any time between Friday at 18:30 to Monday at 06:00, Project Co will be subject to Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

C18.4.6 Bishop Grandin Boulevard

(a) Bishop Grandin Boulevard currently has two lanes of traffic in the eastbound direction and two lanes in the westbound direction. Project Co will be required to maintain traffic as outlined below.

(b) A minimum of two eastbound and two westbound lanes of traffic shall be maintained at all times between 06:00 and 18:30 from Monday to Friday.

(c) A minimum of one eastbound and one westbound lanes of traffic shall be maintained at all times between 18:30 and 06:00 from Monday to Friday, and on weekends form Friday at 18:30 to Monday at 06:00.

(d) Closure of two lanes in a single direction:

(i) Closure of two lanes in a single direction will be permitted to take place with acceptable notice provided to the City of Winnipeg.

(ii) The construction of cross-overs will remove traffic on two adjacent lanes in a similar direction, allowing them to be closed through the construction area, resulting in one lane of traffic in each direction operating on one side of the median. This will only be permitted as follows:

- Between Friday at 18:30 and Monday at 06:00;
- For up to 80 days that fall between Monday at 06:00 and Friday at 18:30;
- The ramp from northbound and southbound Pembina Highway to westbound Bishop Grandin Boulevard shall be maintained at all times; and
- The ramp from eastbound Bishop Grandin Boulevard to Pembina Highway shall only be closed between Friday 20:00 and Monday 04:00.

(iii) Should Project Co have more than 80 days of closure with two lanes in a single direction at any time between Fridays at 18:30 to Mondays at 06:00, Project Co will be subject to Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

(e) Full Roadway Closure

(i) Up to two weekend closures of the roadway below the CN Letellier Rail Bridge over Bishop Grandin Boulevard through the construction area between Friday 20:00 and Monday 04:00 will be permitted with the following provisions

- Two weeks' notice to the City shall be provided;
- Two major regional streets will not be permitted to be closed at the same time. This may include a roadway on a project outside the scope of this Project. Therefore coordination with the City is imperative; and
- A 4 m opening for the passage of emergency vehicles will be available at all times.

(ii) Additional weekend closures of the roadway below the CN Letellier Rail Bridge over Bishop Grandin Boulevard through the construction area between Friday 20:00 and Monday 04:00 may be permitted, subject to the same provisions as above. For clarity, additional weekend closures beyond the maximum allowed closures listed in C18.4.6(e)(i) will be subject to a Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

(f) One lane of pedestrian access shall be maintained at all times below the CN Letellier Rail Bridge over Bishop Grandin Boulevard. Where pedestrian access cannot be maintained due to construction activities, Project Co shall provide an alternative solution for pedestrians to pass through the site which may include temporary ramp curbs or shuttles, subject to Traffic Management Branch review. Failure to meet these requirements will be subject to a Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

C18.4.7 Southpark Drive

(a) One lane of traffic currently exists on Southpark Drive in either direction.

(b) A minimum of one lane of vehicular traffic shall be maintained at all times, which shall provide access for both directions of traffic as long as it is safe to do so.

(c) Pedestrian traffic shall be maintained on Southpark Drive at all times. Where pedestrian access cannot be maintained due to construction activities, Project Co shall provide an alternative solution for pedestrians to travel through the site.

(d) Access to all residences and businesses along Southpark Drive shall be maintained at all times.

(e) Project Co shall open Southpark Drive to two lanes of traffic from the Transitway to Pembina Highway within 10 consecutive weeks of commencement of Southpark Drive as described in C2.1(aaa).

(f) Should Project Co take longer than 10 consecutive weeks to open two lanes of traffic on Southpark Drive, Project Co will be subject to Traffic Management Payment Adjustment in accordance with Schedule 13 – Traffic Management.

C18.4.8 Pembina Highway between Bison Drive and Bishop Grandin Boulevard

(a) A minimum of two northbound lanes of traffic shall be maintained at all times between 06:00 and 22:00.

(b) A minimum of two southbound lanes of traffic shall be maintained at all times between 07:00 and 20:00.

C18.4.9 Within the University of Manitoba, including but not limited to, University Crescent, Dafoe Road, and the bus staging area

(a) A minimum of one lane of vehicular traffic shall be maintained at all times on Dafoe Road and a minimum of one lane of vehicular traffic shall be maintained at all times in either direction on University Crescent.

(b) Pedestrian traffic shall be maintained at all times. Where pedestrian access cannot be maintained due to construction activities, Project Co shall provide an alternative solution for pedestrians to travel through the site.

(c) Work shall not commence within the University of Manitoba until May 1 and shall be completed by August 31 of each year except for any work at the University Crescent and Dysart Road intersection.

C18.5 Roadway Closures

C18.5.1 Project Co shall be responsible for the permanent physical closure of the following:

(a) Median opening on Pembina Highway to Harrow Street;

(b) Parker Avenue from Planet Street to Hurst Way;

(c) Hurst Way from Parker Avenue to 400 m east of Waverley Street on Hurst Way;

(d) Manahan Avenue from Hervo Street to French Street; and

(e) The back lane between Manahan Avenue and Chevrier Boulevard from Hervo Street to French Street.

(f) Partial closure of the median opening on Pembina Highway at Merriam Boulevard, to prevent left turns from westbound Merriam Boulevard at Pembina Highway; and

(g) Parker Avenue east of Wynne Street including the cul-du-sac at the east of Parker Avenue. The access for pedestrians shall remain open.

C18.5.2 Project Co is responsible for all Permits, Licences and Approvals for the physical Roadway closures and removals, construction of the required turnarounds, installation of appropriate signing regarding “no exit”, all flag persons for pedestrian, transit, and emergency vehicles, and installation of barricades and disposal of all materials and restoration of the closed road to a natural landscaped area. The Roadway structure shall be removed, and then top soiled and seeded at a minimum, in accordance with the latest revision of the City of Winnipeg Standard Construction Specifications.

C18.5.3 Alternate access route changes to these Roadways shall be completed before they are closed to traffic. All detours and temporary intersections required to meet this requirement shall be paved. Signage in accordance with the permanent signage plans shall be installed as described in C17 above.

C18.6 Detours

C18.6.1 Project Co is responsible for maintaining existing traffic and access on all Existing Infrastructure and for all properties affected by this project while in Design and Construction.

C18.6.2 Detours for all crossroads, if required, shall maintain safe passage of traffic, and shall allow for a minimum of one open lane in each direction at all times. All such detours shall be constructed with an asphalt surface, and shall have a minimum design speed of 60 kph and posted at 60 kph with advisory speed tabs if there are design elements that cannot meet the 60 kph design speed criteria.

C18.6.3 Additional requirements for the accommodation of traffic during the OMR Period for the duration of the OMR Period are set out in PART E .

C18.7 Canada Summer Games

C18.7.1 The Canada Summer Games will be held in Winnipeg during the summer of 2017. The following will be prohibited during July 24, 2017 to August 13, 2017:

(a) Full roadway closures;

(b) Any Lane Closures on Pembina Highway between Bison Drive and Bishop Grandin Boulevard;

(c) Any closure of the ramp from eastbound Bishop Grandin Boulevard to Pembina Highway; and

(d) Any Lane Closures on University Crescent.

C18.8 Manitoba Marathon

C18.8.1 The Manitoba Marathon is held every year on Father's Day. Its route for 2014 can be found here (http://manitobamarathon.mb.ca/wp-content/uploads/2014/01/Marathon-Map.pdf) and used for reference as a potential route during the Design and Construction of this Project. The following will be prohibited on Father's Day during the Project Term:

(a) Any Lane Closure on University Crescent;

(b) Any closure of the ramp from eastbound Bishop Grandin Boulevard to Pembina Highway; and

(c) Full closures on Pembina Highway.

C18.8.2 Project Co shall ensure that the New Infrastructure, where it overlaps with the Manitoba Marathon, is in order and safe for the event, including litter clean up and street sweeping.

C18.9 Investors Group Field Events

C18.9.1 Throughout the year there are various events at Investor's Group Field, including Winnipeg Blue Bomber football games and special events. On all IGF Event Days, unless otherwise approved in writing by the City or their delegate, the following will be prohibited:

(a) Any Lane Closure on University Crescent;

(b) Less than two lanes in the northbound direction or the southbound direction on Pembina Highway between Bison Drive and Bishop Grandin Boulevard four hours before the event start time through to four hours after the event end time;

(c) Any closure of the ramp from eastbound Bishop Grandin Boulevard to Pembina Highway; and

(d) Full closure on Pembina Highway or Bishop Grandin Boulevard.

C19. AESTHETICS

C19.1 Project Co is advised that the City supports and encourages the inclusion of cost effective features to improve the overall Transitway, grade separation structures, and station aesthetics.

C19.2 Aesthetics Plan

C19.2.1 Project Co shall further develop, implement, maintain, monitor, update, and manage, for the duration of the Project Term, the Aesthetics Plan included with the Aesthetics and Landscaping Design Report submitted by Project Co as part of its Technical Submission.

C19.2.2 As part of the Aesthetics Plan, Project Co shall develop and incorporate in its design an aesthetic theme throughout the Project that shall complement the surrounding environment and generally be aesthetically compatible with features and structures located in Stage 1 Infrastructure and in the general vicinity.

C19.3 Aesthetic requirements related to specific components have been outlined below:

C19.3.1 Stations

(a) Station components and materials are to be aesthetically compatible with those used in the stations for Stage 1 of the Southwest Transitway.

(b) The aesthetic theme for stations shall provide an aesthetically compatible "look and feel" throughout the full length of the Southwest Transitway but, where opportunities exist, should incorporate features that reflect the character of the neighbourhood served by each station.

(c) The aesthetic theme should incorporate the rapid transit logo in prominent station features to reinforce the rapid transit identity amongst citizens.

(d) The aesthetic theme should be of excellent design, be pleasing to the eye, and include components and amenities outlined in these Technical Requirements.

C19.3.2 Grade Separation Structures, Railway Structures, and Earth Retaining Structures Aesthetics

(a) Aesthetics shall be considered in the layout and design of all grade separation, railway, earth retaining, and other structural elements. The aesthetic principles outlined in the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report shall be considered in the layout, shapes, details, finishes, and architectural features of all grade separation structures.

(b) Aesthetics shall be incorporated into abutments, piers, pier caps, and retaining walls. This can be achieved with a number of the following treatments:

(i) Shape, reveals, texturing, and colour; and

(ii) Incorporation of murals or architectural themes.

(c) Aesthetics may also be incorporated in the sidewalks and bridge pedestrian handrails on bridge structures and MSE walls.

(d) All electrical and communication wiring pertaining to the New Infrastructure shall be underground. At points of protrusion through the structural components, care should be given for expansion fittings and other connection requirements, with minimal visual impact.

(e) Bridge headslopes are typically incapable of supporting vegetation due to the shadow created by the bridge structure. On bridge structures, the bridge headslope shall be covered with cast-in-place concrete slope protection that prevents erosion and enhances the appearance of the headslope.

C19.3.3 Tunnel Structure Aesthetics

(a) All AT path and Transitway tunnels shall be fully tiled with porcelain tile.

(b) The tile shall be securely fastened to the concrete with setting mortar suitable for concrete and moisture conditions. The tile shall be durable against physical and chemical attack consistent with salt and sand applications within the splash zone.

(c) The tile shall extend throughout the tunnels and onto the retaining walls at each end of the tunnels. Tiling shall not be abruptly terminated and should fully extend to the ends of the approach retaining walls.

(d) Tiling is not required for the ceiling of the tunnel structures. At a minimum, the ceiling shall be painted white.

(e) Tiling may conflict with mechanical and electrical appurtenances for the upper sections of the tunnel walls and is not required in these conflict locations. The areas of tiling exclusion shall not extend more than 100 mm lower than the appurtenances within the tunnel and not more than 1.5 m down from the ceiling for Transitway tunnels, or 0.5 m down from the ceiling for AT path tunnels.

(f) All tunnel walls not receiving tile shall be painted white prior to installation of the mechanical and electrical appurtenances. Paint to be touched up as required after tiling and mechanical and electrical works are complete.

(g) The intent for the tile of the tunnels is to match the design, size, colour, finish, and general layout (including a tiled RT symbol at each end) used for the Stage 1 Transitway Fort Rouge Tunnel.

(h) The size of tile will vary for Transitway and AT path tunnels due to expected traffic and relative visual impact. The individual tiles for Transitway tunnels shall be no larger than 300 x 300 mm. The individual tiles for AT Path tunnels shall be no larger than 200 x 200 mm.

(i) Tile grout shall be white.

(j) Tiles used for the RT symbol shall be water jet cut.

(k) Install movement joints to meet the most current Terrazzo, Tile and Marble Association of Canada (TTMAC) guide.

(l) Do not cover any substrate expansion or control joints with mortar or tiles. Joint widths shall match the joint widths in the concrete substrate.

(m) Stainless steel edging shall be installed at all movement, expansion, and control joints, exterior edges, and above traffic barriers.

(n) Reference Information

(i) For reference purposes only, the tile for the Transitway's Fort Rouge Tunnel was originally supplied by Casalgrande Padana with colours and finishes as follows:

- Unicolore, Granitogres – Nero;
- Unicolore, Granitogres – Violet;
- Unicolore, Granitogres – Blu Forte;
- Unicolore, Granitogres – Bianco Assoluto; and
- Caleidoscopio, Monopadana – Rosso Selenio.

(ii) Reference drawings from the Stage 1 Osborne Station and Fort Rouge Tunnel have been included as Project Background Information and show the wave pattern and edge colouring.

(o) At Substantial Completion, Project Co shall supply the City with a quantity of 5% of the total number of tiles placed for each size, type and colour, for future OMR Services.

C19.3.4 Noise Attenuation Walls

(a) The Aesthetics Plan shall consider the aesthetics of the noise attenuation walls to make it pleasing to the eye for both the residents and the Infrastructure Users.

C20. ILLUMINATION

C20.1 Project Co is responsible for completing and coordinating the Design and Construction of all required illumination for the New Infrastructure, both Utility Work and Specified Utility Work, including but not limited to, Roadways, Transitway, AT path, Park and Ride facilities, Kiss and Ride facilities, parking lots, Stations, and beneath structures and within tunnels.

C20.2 All lighting shall be white LED lighting.

C20.3 All costs for lighting design and installation shall be the responsibility of Project Co.

C20.4 All designed systems shall be in accordance with the Canadian Electrical Code and the regulations of the electrical inspection agency having jurisdiction. Any work by Manitoba Hydro will be coordinated by Project Co and Manitoba Hydro will be treated as a Project Co Party, similar to the other Utility Companies. Project Co shall coordinate and schedule all work for the Permits, Licences and Approvals, cutovers, or other requirements of the illumination Design and Construction that may be required of Manitoba Hydro to ensure integration with Project Co's Design and Construction Schedule and delivery of the Project.

C20.5 Project Co will be required to obtain the necessary agreements with Manitoba Hydro for the illumination. The City will be the customer pursuant to the Manitoba Hydro Electric Service Agreement for the street lighting; however, the following provisions should be noted:

(a) Project Co will pay Manitoba Hydro for the cost of electric power and OMR Services for the street lighting of the Transitway including through the Southwood Lands, and the AT path, during the OMR Period and any lighting turned on prior to Substantial Completion. The on-going costs for the OMR Services for the street lighting shall not be covered as part of the costs outlined in F17 of the Project Agreement; and

(b) Project Co will not be required to pay Manitoba Hydro for the cost of OMR Services for the street lighting during the OMR Period of Roadways within open right-of-ways, including but not limited to, Pembina Highway, Georgina Street, Beamount Street, Hurst Way, Parker Avenue, Edderton Avenue, Seel Avenue, Waller Avenue, Clarence Avenue, Chevrier Boulevard, French Street, Chancellor Drive, Markham Road, Southpark Drive, and University Crescent.

C20.6 Project Co will be responsible for all other electrical infrastructure related to the grade separation structures including, but not limited to, bases, supports, junction boxes, conduit and unique poles on the grade separation structures and the underpass lighting. All wiring is to be underground.

C20.7 Project Co is responsible for power supply, Design and Construction, and removal of all temporary illumination required during the Construction Period.

C21. UTILITY ACCOMMODATION

C21.1 Utility Work means the Design and Construction of the following Utility Infrastructure impacted by Design and Construction of the New Infrastructure including, but not limited to:

(a) Municipal utilities;

(b) Utility Infrastructure owned by the University of Manitoba;

(c) Utility Infrastructure owned by the Winnipeg Football Club;

(d) Utility Infrastructure owned by Triple B Stadium Inc.;

(e) Station utility requirements for lighting, power, and service to amenities;

(f) Lighting under a structure or in a tunnel as outlined in C7.11;

(g) Park and Ride lighting as outlined in C9.7;

(h) Kiss and Ride lighting as outlined in C9.8.4; and

(i) Parking lot lighting as outlined in C9.8.

C21.1.2 Utility Work excludes Specified Utility Work.

C21.2 Specified Utility Work means the Design and Construction of the following Utility Infrastructure impacted by Design and Construction of the New Infrastructure:

(a) Manitoba Hydro – distribution;

(b) Manitoba Hydro – communication;

(c) Manitoba Hydro – other, including:

(i) Power to transit stations; and

(ii) Power to pump stations.

(d) Manitoba Hydro – lighting, including;

(i) Roadways;

(ii) Transitway; and

(iii) AT paths.

(e) Manitoba Hydro – gas;

(f) Manitoba Telecom Services (MTS);

(g) Shaw;

(h) Pembina Trails School Division – fibre;

(i) Teraspan;

(j) Rogers;

(k) Bell;

(l) Telus;

(m) City of Winnipeg – Signals;

(n) City of Winnipeg – Traffic Services;

(o) CN – Signals; and

(p) CN –CTC System.

C21.3 The following items will not be considered Utility Work or Specified Utility Work:

(a) Manitoba Hydro – transmission;

(b) Manitoba Hydro – grounding study as outlined in C22.3.10;

(c) CN – flagging;

(d) CN – supply of material;

(e) Protection of Utility Infrastructure through the use of a protecting slab or bridging structure.

C21.4 Project Co shall submit all Utility Infrastructure design at 90% to the City of Winnipeg Underground Structures branch for circulation. Following 10 Business Days of the City's receipt of the 90% Submittal, Proponents will be permitted to proceed with construction without a response from the City of Winnipeg Underground Structures Branch.

C21.5 During Design and Construction, Project Co shall undertake or accommodate Utility Work and Specified Utility Work, associated with all New Infrastructure within the Construction Period Lands. All costs for Utility Work and Specified Utility Work, other than as set out in F17 of the Project Agreement shall be borne by Project Co.

C21.6 Any services provided by the City of Winnipeg Traffic Signals and Traffic Services Departments required as outlined in the Technical Requirements, including but not limited to, C8, C11, C17, C18, C21, and D5 shall be included in Specified Utility Work with all costs borne by Project Co as set out in F17 of the Project Agreement.

C21.7 Project Co shall coordinate and schedule all work for the Utility Infrastructure design and installation or relocation to ensure integration with Project Co's Design and Construction Schedule and timely delivery of Design and Construction.

C21.8 Project Co is responsible for all Utility Company fees, capital and operating costs (including electricity, natural gas, communications and water and sewer) during Design and Construction. Project Co shall coordinate efforts with and seek approval of the City when entering into an agreement with a Utility Company on behalf of the City. All Utility Work and Specified Utility Work Permits, Licences and Approvals shall be obtained in writing and shall include a relocation schedule.

C21.9 The City of Winnipeg has established Utility Company contacts with the following:

(a) Manitoba Hydro – Overall Project Coordination
(Including Transmission, Distribution, Communication, Lighting, and Gas)
Contact: Brian Adamyk
Phone: 204-360-7588
Email: badamyk@hydro.mb.ca

(b) University of Manitoba
Contact: Rejeanne Dupuis, Campus Planning Office
Phone: 204-474-6095
Email: Rejeanne.Dupuis@umanitoba.ca

(c) CN

Contact: Shane McCartney
Phone: 204-231-7763
Email: shane.mccartney@cn.ca

(i) Communication with CN is only permitted after Commercial Close.

(d) MTS Allstream Inc.
Contact: Mark Key
Phone: 204-985-2450
Email: mark.key@mts.ca

(e) Shaw Communications Inc.
Contact: Rodney Caners
Phone: 204-480-3479
Email: rodney.caners@sjrb.ca

(f) Pembina Trails School Division
Contact: Derek Boutang
Phone: 204-488-1767 ext1223
Email: dboutang@pembinatrails.ca

(g) City of Winnipeg Traffic Signals Branch
Contact: Michael Cantor
Phone: 204-986-2619
Email: mcantor@winnipeg.ca

(h) City of Winnipeg Traffic Services Department
Contact: Greg Skinner
Phone: 204-794-4294
Email: gskinner@winnipeg.ca

(i) City of Winnipeg Underground Structures (for Accessing Record Drawings)
Contact: Jim Horne
Phone: 204-986-2748
Email: jhorne@winnipeg.ca

(j) City of Winnipeg Departments
(Public Works, Traffic Management, Forestry, Water and Waste, Transit, etc.)
Contact: Scott Payne
Phone: 204 794-4369
Email: spayne@winnipeg.ca

(k) Bell Canada
Contact: Corey Trueman
Phone: 403 410-4571
Email: Corey.trueman@bell.ca

(l) Rogers (within CN Right-of-Way)
Contact: Brad Betker (CN)
Phone: 204 792-1325
Email: brad.betker@cn.ca

(m) City of Winnipeg, Underground Structures
Contact: Derrick Saedal

Phone: 986-6400
Email: dsaedal@winnipeg.ca

(n) TeraSpan

Contact: Mike Callaghan
Phone: 604 638-1592
Email: mcallaghan@teraspan.com

C21.10 Project Co shall ensure that all Utility Infrastructure is adequately protected from both long-term and short-term damage due to Design and Construction.

C21.11 At a minimum, Project Co shall provide 1 m horizontal distance between structural foundation or structural substructure elements of the New Infrastructure and any Utility Infrastructure. The vertical distance requirements between the Roadway or Transitway pavement substructure and any Utility Infrastructure shall meet the requirements set out by the specific utility.

C21.12 Disruptions to Utility Work and Specified Utility Work shall be minimized as much as possible. Should a disruption be required, appropriate notice shall be given by Project Co or a Utility Company for any Utility Work or Specified Utility Work taking place.

C21.13 Due to events taking place on the University of Manitoba campus, at Investors Group Field Stadium similar to those outlined in C18.7 through C18.9, should a disruption be required to any Utility Work as outlined in C21.1(b), (c), or (d), Project Co shall review the planned disruption with the party to be disrupted at least seven days prior to the disruption, agree to the disruption date, all parties acting reasonable. Project Co shall provide an additional notification, between 48 and 24 hours, prior to disruption of the Utility Work. Project Co shall take reasonable measures to minimize the impact. For Utility Work within the University of Manitoba campus, minimizing impact shall be taken to mean that Project Co shall attempt to complete Utility Work between May 1 and August 31 for any disruptions in service.

C21.14 When requesting attention to an item that needs to be addressed by a Utility Company, Project Co is to provide adequate notice to the Utility Company in an amount of days that are mutually agreed upon with the Utility Company or as otherwise specified in writing.

C21.15 Upgrades to a Utility Company's infrastructure for Specified Utility Work will not be covered under Specified Utility Costs. An upgrade constitutes the instances where a Utility Company wishes to, for example, increase the size of a pipe, number of conduits/lines or go from overhead to underground; incremental costs such as this are considered upgrades and will not be part of Specified Utilities unless approved by the City.

C21.16 The design of the overhead utility relocations between Investors Group Field and IGF Station was completed prior to Financial Close by the University of Manitoba in order to expedite the utility relocations for the Stadium Access Works. Project Co shall contact the University of Manitoba directly to obtain this information. Project Co will not bear the cost for this design work; however, the costs for the construction of the overhead utility relocations will be borne by Project Co. Project Co will be responsible for any design work and costs required outside of the utility relocation design work undertaken by the University of Manitoba for the Stadium Access Works.

C22. MANITOBA HYDRO REQUIREMENTS

C22.1 Approximately 3.5 km of Transitway is within the Manitoba Hydro Right-of-Way. Therefore, the Transitway alignment is adjacent to numerous Manitoba Hydro transmission lines, distribution lines, and communication lines.

C22.2 Property

C22.2.1 All property requirements within Manitoba Hydro Right-of-Way, including property for the areas of the Transitway, stations and structures will be obtained as outlined in Schedule 12 – Lands and Identified Encumbrances. Property for the drainage, Park and Ride facilities, Kiss and Ride facilities, will be through a lease agreement between the City and Manitoba Hydro. The agreement for the AT path to be placed in the Manitoba Hydro Right-of-Way will be through a licence between the City and Manitoba Hydro, which will be obtained by the City.

C22.2.2 The Permits, Licences and Approvals needed to obtain property for staging areas, laydown areas, and construction access points within the Manitoba Hydro Right-of-Way for Project Co's Design and Construction shall be pursued by Project Co directly from Manitoba Hydro.

C22.3 Design

C22.3.1 Manitoba Hydro will be required to review all designs for impacts on its infrastructure, including height restrictions, alignments, drainage, access for service vehicles and other construction impacts to Manitoba Hydro. Manitoba Hydro will require six to eight weeks to review the design for the New Infrastructure within the Manitoba Hydro Right-of-Way. Project Co shall take into consideration the full build-out of the Manitoba Hydro transmission lines into their design. Project Co shall take into consideration for their design, the full build-out of the Manitoba Hydro transmission line alignments and tower locations of the two transmission lines being built in 2016 and only the alignment, not the tower locations, of the three future transmission lines.

C22.3.2 Project Co shall be responsible for all Permits, Licences and Approvals required for each component of the Project within the Manitoba Hydro Right-of-Way.

C22.3.3 Project Co will be responsible for all Utility Work and Specified Utility Work within the Manitoba Hydro Right-of-Way affected by the Project.

C22.3.4 Project Co shall be responsible for following all design requirements and restrictions set out by Manitoba Hydro, both within the Technical Requirements and provided by Manitoba Hydro.

C22.3.5 Manitoba Hydro requires access to their transmission lines seven days a week, 24 hours a day.

C22.3.6 Manitoba Hydro requires a flat area around each transmission tower with a dimension of 6 m in each direction away from the tower base to allow for a bucket truck to be stationed at the base of the tower for maintenance. Manitoba Hydro requires the soil above the tower foundations to remain.

(a) The clear zone requirement will be relaxed in parking lot areas, allowing the parking lot driveway or aisleway to fall within the 6 m clear zone when vehicles collision barriers are installed (e.g., decorative boulders, concrete filled bollards, etc.).

C22.3.7 There is a Manitoba Hydro line on the west side of the CN Letellier subdivision south of Bishop Grandin Boulevard. In this area the CN Letellier rail line will need to be relocated. Manitoba Hydro has a minimum conductor swing clearance requirement of 7.514 m from the center of the rail line to the center of the Manitoba Hydro distribution line, which shall be maintained.

C22.3.8 The maximum height of any full grown mature tree, bush or shrub within the Manitoba Hydro Right-of-Way shall be no more than 3.65 m in height and shall be at least 6 m from all Manitoba Hydro infrastructures.

C22.3.9 Maximum height of light standards, signs and poles shall be in accordance with Manitoba Hydro requirements.

C22.3.10 All stations within the Manitoba Hydro Right-of-Way shall be grounded. Manitoba Hydro will require an engineered sealed written confirmation stating that the station is grounded and how it is grounded.

C22.3.11 Drainage

(a) Manitoba Hydro will permit an open drainage system within the Manitoba Hydro Right-of-Way as long as C22.3.5 is maintained.

(b) Requirements set out in C10 shall be followed.

(c) Increases in ground elevation shall be reviewed by Manitoba Hydro.

(d) Transmission line tower foundations shall be mounded to prevent ponding of water.

C22.3.12 AT Path

(a) The AT path will be permitted beneath transmission towers and lines; however, height restrictions for construction and maintenance equipment and lighting will need to be followed. Any restrictions for the Design and Construction within the Manitoba Hydro Right-of-Way shall be coordinated with Manitoba Hydro.

C22.3.13 Structural elements such as structurally reinforced embankments shall not be constructed outside of the Construction Period Lands or in the Manitoba Hydro Right-of-Way.

C22.4 Manitoba Hydro Transmission Line Relocation

C22.4.1 The Manitoba Hydro Transmission Line Relocation means the transmission tower line work in the Manitoba Hydro Right-of-Way from the intersection of the Manitoba Hydro Right-of-Way at the CN mainline (at Daniel Street) to the intersection of the Manitoba Hydro Right-of-Way at Bishop Grandin Boulevard. This work includes the design and installation of two new transmission tower lines immediately south and east of the existing transmission tower line on the north and west side of the Manitoba Hydro Right-of-Way. It also includes the removal of the transmission tower line second from the south and east side of the Manitoba Hydro Right-of-Way (existing middle line of the three transmission tower lines) and the raising of transmission towers needed due to the height of Park and Ride lighting, Transitway lighting, and station canopies. This work will be completed by Manitoba Hydro and is not included in this Project scope of work.

C22.4.2 As part of the work outlined above, Manitoba Hydro has also commenced the design of the distribution infrastructure for this Project. The Manitoba Hydro distribution design being carried out at this time, as described below, will not be a cost borne by Project Co. The remaining design outside of what is listed below, construction and relocation of the distribution infrastructure, is included in the Project as Specified Utility Work. Project Co shall coordinate these works with Manitoba Hydro. The distribution design being undertaken by Manitoba Hydro and paid for by the City is as follows:

(a) Perform design work for the following conflict points to 90% completion

(i) Relocate hydro pole in the center median of University Crescent at IGF Station;

(ii) Raise or relocate poles where the proposed Transitway crosses Markham Road;

(iii) Remove or relocate hydro works on the north side of Chancellor Drive, east of the CN rail line;

(iv) Relocate distribution poles and lines located within the Manitoba Hydro Right-of-Way from Manitoba Hydro's French Station to the east end of the Parker Lands; and

(v) Relocate distribution poles and lines that cross the proposed Transitway throughout the Manitoba Hydro Right-of-Way.

(b) Perform design work for the following conflict points to 30% completion:

(i) Relocate overhead and underground communications facilities;

(ii) Distribution lines on east side of CN rail line from Southpark Drive to 300 m north of Southpark Drive;

(iii) Distribution lines in the Manitoba Hydro Right-of-Way north of Bishop Grandin to Manitoba Hydro's French Station;

(iv) Pembina Highway and Markham Road intersection design to accommodate Transitway, turn lane, and Kiss and Ride parking along Markham Road;

(v) Relocate street lights along Southpark Drive;

(vi) Relocate street lights at Chancellor Drive and the proposed Transitway;

(vii) Convert existing overhead crossings at the proposed Chancellor Station to underground crossings; and

(viii) Protect or rebuild the Manitoba Hydro duct line crossing south of Bishop Grandin.

C22.4.3 Any Manitoba Hydro transmission relocations or adjustments outside of C22.4.1 mentioned above, Project Co shall discuss directly with Manitoba Hydro, will not be considered Specified Utility Work and will be costs borne by Project Co.

C22.5 Design and Construction of Manitoba Hydro New Infrastructure

C22.5.1 Project Co shall carry out Utility Work and Specified Utility Work with respect to Manitoba Hydro electric, communication, gas and street lighting, excluding the design outlined in C22.4.2.

C22.6 Construction of the Project

C22.6.1 Manitoba Hydro's local line inspector shall be contacted prior to construction for information relating to minimum clearances between any equipment and energized transmission line conductors.

C22.6.2 Manitoba Hydro will not permit any construction equipment within 15 m from the alignment of the center of the base of a transmission tower.

C22.6.3 Project Co may require a safety watch for activities around Manitoba Hydro infrastructure. Project Co shall review this requirement with Manitoba Hydro and obtain the Permits, Licences and Approvals prior to construction activities taking place within the Manitoba Hydro Right-of-Way.

C22.6.4 Manitoba Hydro will not permit any construction within 6 m from all tower legs, at ground level.

(a) The clear zone requirement will be relaxed in parking lot areas, allowing the parking lot driveway to fall within the 6 m clear zone when vehicles collision barriers are installed (e.g., decorative boulders, concrete filled bollards, etc.).

C22.6.5 Manitoba Hydro reserves the right to request that Project Co provide a full listing of all equipment and operations prior to any work taking place within the Manitoba Hydro Right-of-Way.

C22.6.6 No material, such as gravel, earth, snow, etc. shall be stockpiled, even temporarily, within the Manitoba Hydro Right-of-Way. Snow needing to be pushed out of the way during the Construction Period shall be hauled away and not stockpiled.

C22.6.7 Manitoba Hydro will not be responsible for induced voltages on vehicles or objects under Manitoba Hydro transmission lines. It should be noted that induction of current can occur on vehicles under transmission lines. Although this may be considered a nuisance, it is not dangerous.

C22.7 Work by Others

C22.7.1 Manitoba Hydro is anticipating the installation of a duct bank line within the Construction Period Lands from Bishop Grandin Boulevard to Markham Road. This work will not be part of this Project; however, Manitoba Hydro may have interest in coordinating this work with Project Co during the Design and Construction for efficiency purposes.

C23. RAIL WORK

C23.1 Stage 2 of the Transitway will have an impact on rail at the locations of the north and south mainline CN Rivers subdivision, the CN Letellier subdivision, CN North Spur Line (WC07 to Manitoba Hydro) and CN South Spur Line (WC21 to Harris Transport). The Rail Work will be as follows:

(a) New CN structure for CN Rail Bridge over Pembina Highway and associated track relocation (CN Rivers Mile 2.65);

(b) Demolition of existing CN Rail Bridge over Pembina Highway and its retaining walls;

(c) New retaining wall along the north extent of the CN Rivers subdivision, west of the CN Rail Bridge Over Pembina Highway, to accommodate the future fourth track extension;

(d) New CN Rail Bridge over Transitway at the CN Wye (CN Letellier) at the intersection of the CN Rivers and CN Letellier subdivisions (connection to mainline from east) and associated track relocation;

(e) New CN Rail Bridge over Transitway at the CN Wye (WC02 Spur) at the intersection of the CN Rivers and CN Letellier subdivisions (connection to mainline from west) and associated track relocation;

(f) A new Transitway Underpass of CN Wye Tracks at the CN Portage Junction and associated CN detours and relocations in the CN Rivers and the CN Letellier subdivisions;

(g) A new grade separation of the industrial spur lines and the CN Letellier subdivision (CN Letellier Mile 1.88) and associated CN detours and track relocations;

(h) A CN rail bridge over Bishop Grandin Boulevard (CN Letellier Mile 2.46);

(i) New retaining wall along the east extent of the CN Letellier subdivision, south of the CN Letellier Rail Bridge over Bishop Grandin Boulevard;

(j) Any associated relocations of CN Letellier rail line between Chevrier Boulevard (CN Letellier Mile 1.65) and up to 150 m south of Markham Road (CN Letellier Mile 3.23);

(k) Demolition of any portion of the existing CN rail bridge over Bishop Grandin Boulevard that is not utilized for the New Infrastructure;

(l) The new at-grade AT Path Connection to Hopewell Lands across the CN Letellier rail line west of Plaza Drive at the Plaza Station (CN Letellier Mile 2.23) also impacts rail; and,

(m) The relocation of any CN bungalow, structure, maintenance facility, or buildings in order to accommodate the New Infrastructure shall be the responsibility of CN including but not limited to, relocation of the structure, utility disconnection or reconnection, and costs associated with this work. The aforementioned CN bungalow, structure, maintenance facility, or buildings are anticipated to be relocated in the spring of 2016.

C23.2 Structure Identification (Number)

C23.2.1 All Design and Construction for the railway structures shall make reference to the City's identification method for infrastructure.

C23.2.2 The structure numbers for the New Infrastructure will be provided by the City at a later date.

C23.2.3 The structure numbers for the Existing Infrastructure shall also be referenced as necessary and are as follows:

(a) U201 – Pembina Highway Underpass (Mile 2.65 CN Rivers); and

(b) U230 – Route 165 Underpass (Mile 2.46 CN Letellier).

C23.3 Property

C23.3.1 See Schedule 12 – Lands and Identified Encumbrances.

C23.4 Design

C23.4.1 Project Co will conduct Design and Construction of Rail Work in accordance with CN requirements respecting safe rail operations and the *Railway Safety Act*.

C23.4.2 CN will approve all Rail Work including, but not limited to, design of rail grade separation structures, rail shooflies, rail realignments, and any other Rail Work impacting CN rail infrastructure and the two industrial leads south of Chevrier Boulevard. Project Co is required to submit designs for CN's review at 60% design, 90% design, and IFC. CN"s review period will be between four to six weeks for the 60% and 90% design, and 10 Business Days for the IFC for the design drawing set for each preliminary layout, design review, construction staging and shop drawings for each structure, Demolition or track relocation. All drawings for a structure and its associated track relocation shall be submitted together. CN"s review process will follow the City's process, which is "Received", "Comments", or "Observations". CN"s review of the re-submission documents will follow the City's process.

C23.4.3 The City will be responsible for the Master Agreement application to Transport Canada between the City and CN with respect to any new or revised railway and Roadway crossings pertaining to the New Infrastructure. Pipe crossing agreements, wire crossing agreements, and overhead crossing agreements will also be required by CN for any new or revised Utility Work or Specified Utility Work infrastructure that crosses or enters into the CN Right-of-Way. For these agreements, the City will be responsible for the agreements where the City will be entering into an agreement with CN on infrastructure that will be owned by the City, such as municipal utilities (LDS, watermain, sewers) and Project Co will be responsible for the agreements where the City will not be involved with the agreement, such as the various other utilities (Manitoba Hydro, MTS, Bell, etc.). Furthermore, Project Co shall be responsible for all other Permits, Licences and Approvals required outside of the aforementioned agreements.

C23.4.4 Design shall also follow Transport Canada requirements.

C23.4.5 Project Co shall satisfy all design requirements provided in *Appendix H – CN Guidelines*. Where conflicts occur between C23 and *Appendix H – CN Guidelines*, the most stringent shall govern.

(a) Further to C23.4.5, it is understood that all CN standards may not be able to be met realizing the current conditions and land restrictions at some locations. During the design and review process with Project Co these standards will be reviewed, taking into consideration location and impacts and every attempt will be made to balance CN requirements and safety to approve a design that is optimal for the specific situation.

C23.5 Railway Track Relocation

C23.5.1 The design of all railway track relocations shall satisfy all design requirements provided in *Appendix H – CN Guidelines*, except for the following:

(a) Main track shall have #12 turnouts at a minimum.

C23.6 Railway Structures Design

C23.6.1 The major rail structures, which are components of the Rail Works described in C23.1, are as follows:

(a) CN Rail Bridge over Pembina Highway and retaining wall west of Pembina Highway;

(b) CN Rail Bridge over Transitway at the CN Wye (CN Letellier);

(c) CN Rail Bridge over Transitway at the CN Wye (WC02 Spur);

(d) Transitway Underpass of CN Wye Tracks;

(e) Letellier Grade Separation; and

(f) CN Letellier Rail Bridge over Bishop Grandin Boulevard and retaining wall south of Bishop Grandin Boulevard.

C23.6.2 General

(a) The requirements to be met in the design of all railway structures are specified in the Technical Requirements and address the areas of design, safety, functionality/ serviceability, durability/maintainability, and aesthetics. If a requirement is not specified in the Technical Requirements, the requirement shall be set to Good

Industry Practice being met on new structures of similar type in the City, subject to CN approval.

(b) Grade separation structures shall be designed to be structurally and operationally safe in terms of accommodation of traffic, operations, and inspection and maintenance for the entire duration of their service life. All designs shall incorporate the appropriate selection of design concepts and code provisions, design details, specifications, materials, and construction methods and techniques.

(c) Where any railway structure varies from what is shown in the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report, Project Co shall be responsible for satisfying the following requirements:

(i) The structures are contained within the Construction Period Lands;

(ii) Any accommodation of Existing Infrastructure due to the impact of the Design and Construction by Project Co through, but not limited to, removal, relocation, or protection shall be addressed;; and

(iii) Project Co shall develop a stakeholder management plan that addresses the issues that may be raised by stakeholders living adjacent to that railway structure, including, but not limited to, increased noise levels, property value concerns, aesthetics, and safety. This plan shall be included in Project Co's public engagement strategy in accordance with Schedule 24 – Communications Plan.

(d) Notwithstanding C23.6.2(c), an overpass of the CN Portage Junction will not be permitted.

C23.6.3 Responsibility for Design

(a) Project Co shall be responsible for completing the structural, hydraulic, geotechnical, foundation, and slope stability design for railway structures, including grade separation structures, earth retaining structures, and culverts, as detailed in this section and to produce engineered drawings. Project Co is also responsible for all necessary investigations and the design of all elements of the New Infrastructure including, but not limited to; all additional geotechnical investigations, hydro-geological and hydro-technical design, environmental considerations and permits, topographic surveys, in-stream watercourse surveys, Permits, Licences and Approvals, and other field investigations and technical analysis required to complete the designs in a professional and competent manner while following Good Industry Practice.

(b) All drawings and reports shall be sealed in accordance with the requirements of APEGM.

C23.6.4 Design Criteria

(a) All railway structures and connected earth retaining structures, as well as major drainage culverts under the railway shall be in accordance with Manual for Railway Engineering, AREMA, and Appendix H – CN Guidelines to be structurally and functionally safe in terms of accommodation of rail traffic for the duration of the 75-year service life. Where necessary, the CAN/CSA-S6-14, the CHBDC shall be used to supplement the AREMA Manual and Appendix H – CN Guidelines.

(b) A Cooper E90 rail loading shall be used for all structural design.

(c) Where specifically noted otherwise in the Technical Requirements, key components may be subject to design utilizing alternate design codes. Structural design shall be in accordance with those design codes where applicable.

(d) Where specifically noted in the Technical Requirements, materials and coatings for structural components may vary from what is indicated in Appendix H – CN Guidelines. Material and coating selection for these components shall be in accordance with the Technical Requirements and will supersede the requirements noted in Appendix H – CN Guidelines.

(e) All design of Rail Work shall be designed for the "CN Standard Clearance Diagram for All New Railway Bridges" as shown in drawing K1U-10.1i in Appendix H – CN

Guidelines. Where the dimensions of rail structures found in the Southwest Transitway Stage 2 – Functional Design Report conflict with this clearance envelope, Project Co shall be responsible for providing the required clearance. Provision of the required clearance envelope does not eliminate the requirements for provision of trainman's walk, catwalks, and refuge bays.

(f) The NFPA 502: Standard for Road Tunnels, Bridges, and Other Limited Access Highways design standard shall be incorporated for the design of CN structures.

C23.7 Vertical and Horizontal Clearance Requirements

C23.7.1 The minimum vertical clearance for all railway structures shall be 5.3 m, unless noted otherwise.

C23.7.2 The CN Rail Bridge over Pembina Highway shall have a minimum vertical clearance of 5.0 m.

C23.7.3 During the Design and Construction of the CN Rail Bridge over Pembina Highway, a temporary minimum vertical clearance of 4.25 m will be permitted with a final vertical clearance of 5.0 m requirement after the Reconstruction of the Roadway in the underpass is complete.

C23.7.4 For collision protection of the steel plate girders at the CN Rail Bridge over Pembina Highway, Project Co. shall provide concrete infill as a shown in Figure 42a of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*. The use of sacrificial beams will not be permitted.

C23.7.5 The minimum horizontal clear distance between any City bridge structures shall be 2.5 m and between any CN bridge structures shall be 0.75 m. Refuge bays will be exempt from the 2.5 m horizontal clear distance requirement; however, projection into the 2.5 m clearance should be minimized.

C23.7.6 Notwithstanding C23.7.2, Project Co shall provide 5.3 m vertical clearance for the future superstructure extension of the CN Rail Bridge over Pembina Highway if a cast-in-place concrete deck on a steel plate girder system is not utilized.

C23.8 Superstructure Design

C23.8.1 CN will not permit post-tensioned bridges or continuous bridges. The following is a listing of the acceptable grade separation types for CN.

(a) CN Rail Bridge over Pembina Highway

(i) CN will only permit a steel girder with cast-in-place concrete deck. Spans are to act as simple spans with deck joints over the piers, but the deck can be cast continuously across the deck in the lateral direction.

(ii) The new CN Rail Bridge over Pembina Highway shall be wide enough for three rail lines. The bridge substructure shall be constructed to accommodate a future superstructure extension for a fourth railway track to the north. The structure shall also be designed with consideration given to the ease and ability to widen the superstructure by one track to the north, especially in terms of the curb, trainman's walk, railing, and utility accommodation (ducts).

(iii) The service road as shown in Figure 42a of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* has been deleted and shall not be accommodated for in the design and construction of the superstructure.

(iv) The design of the superstructure shall accommodate deletion of the service road as noted in C23.8.1(a)(iii). The offsets and distances from the centerline of Letellier subdivision (Southernmost) line to the curb, railing, and trainman's walk shall match the offsets and distances shown for the N. Mainline Rivers Sub. (Northernmost) line as shown in Figure 42a of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*.

(v) Currently there is a cross over on the bridge structure that exists between the south mainline and the CN Letellier rail track. This cross over should be

relocated off the bridge. If relocating the cross over off the bridge in conjunction with C23.18 cannot be accomplished, refer to C23.4.5(a).

(b) Transitway Underpass of CN Wye Tracks

(i) CN will permit a through plate girder (TPG), steel girder with cast-in-place concrete deck, laterally post tensioned precast concrete box assemblies, or cast-in-place concrete bridge structures at these locations.

(c) Letellier Grade Separation

(i) CN will permit a similar tunnel structure for a tunnel at the Letellier Grade Separation as was designed and constructed under the CN tracks for Stage 1 of the Transitway.

(d) CN Letellier Rail Bridge over Bishop Grandin Boulevard

(i) Relocating the existing CN rail bridge superstructure for the Rail Work will not be permitted.

(ii) In order to maintain the vertical clearances required at this location and prevent a significant increase in track height to meet this requirement, for the New Infrastructure only a TPG structure will be considered at this location.

C23.8.2 General

(a) All slab on girder railway bridges shall be designed to accommodate removal of the deck slab for a single track while maintaining structural adequacy, for maintenance, rehabilitation, or expansion purposes. The remainder of the girders and tracks will remain in service and the design should eliminate excessive fatigue or loading on the other components of the bridge.

(b) For railway bridges that utilize steel girders, a minimum of 450 mm shall be provided between the edges of the bottom flanges to allow proper inspection and maintenance.

C23.8.3 Precast Concrete Elements

(a) All precast concrete elements shall be fabricated at facilities that are certified to the Canadian Precast/Prestressed Concrete Institute (CPCI) Certification Program.

(b) Precast deck elements will not be permitted below grade at the Letellier Grade Separation.

C23.8.4 Bridge Bearings

(a) Allowable bearings types are as follows:

(i) Bronze spherical bearings.

(b) The use of alternate bearing types may be approved on a case by case basis provided it can be shown that the design can accommodate the rotations and loads anticipated and the bearing types are in accordance with Appendix H – CN Guidelines. All requests for substitutions to CN shall be made through the Lead Rail Manager

(c) For all bridge structures, jacking locations shall be provided for future maintenance.

(d) For all bridge structures, fall arrest anchor points shall be provided at each substructure unit location for future inspection and maintenance of the bearings, piers, and abutments.

C23.9 Substructure Design

C23.9.1 Bridge Abutments

(a) The horizontal surfaces of all bearings seats shall have a minimum of 1% slope to the abutment face to allow drainage off the bearing seat.

(b) A structure identification date shall be included on all bridges indicating the year of their construction. The date shall be cast into the concrete of each abutment in a prominent location. The size of the structure identification date shall be as shown in Appendix E – Standard Construction Details.

C23.9.2 Bridge Foundation

(a) Allowable foundation pile types are as follows:

(i) Steel H piles;

(ii) Precast concrete piles;

(iii) Cast-in-place rock socketed concrete caissons; and

(iv) Cast-in-place concrete piles.

(b) All caissons shall be permanently sleeved with steel pipes with a minimum thickness of 20 mm. The steel pipe sleeves should extend for the entire length of the caisson, i.e. terminate at the underside of the abutment footing or pier footing/cap.

(c) Exposed (i.e., above ground level) steel sleeves shall be metalized or hot dip galvanized and shall be painted with a polyurethane coating to match the colour of the surrounding concrete components. Coatings shall extend 1 m below grade. The paint shall be in accordance with Appendix D – Standard Structural Specifications.

(d) The use of reinforced earth and MSE wall support as substructure foundations will not be permitted.

(e) Spread footings will not be permitted.

C23.9.3 CN Rail Bridge over Pembina Highway:

(a) The service road as shown in Figure 42a of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report is not required and shall not be accommodated for in the design and construction of the substructure.

C23.9.4 The rail bridge substructure shall be fully constructed to the northern limits shown in Figure 42a of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*, specifically the substructure for the area denoted for future widening.

C23.9.5 Letellier Grade Separation

(a) Tunnel raft foundations shall not be used as a driving surface for the Transitway.

(b) A structure identification date shall be included on the Letellier Grade Separation indicating the year of its construction. The date shall be cast in prominent locations. The size of the structure identification date shall be as shown in Appendix E – Standard Construction Details.

C23.9.6 Earth Retaining Structures

(a) Retaining Walls

(i) The permitted retaining wall structure types are as follows:

- MSE walls;
- Steel sheet pile walls; and
- Concrete cantilever walls.

(ii) All retaining walls shall be concrete faced.

(iii) All retaining walls shall have a coping at the top of the wall.

(b) MSE Walls

(i) Two stage MSE wall systems will not be permitted. The MSE walls shall have a precast concrete panel face.

(ii) Granular backfilled steel wire retaining walls will not be permitted.

(iii) The MSE walls shall have a top coping cap and shall be able to accommodate movement of the substrate soils and shrinkage of the coping system.

(iv) The Roadway approach barriers shall not be cast on top of the MSE walls.

(v) The City's preferred barrier and wall top treatment is shown in Appendix E – Standard Construction Details, which includes the barrier interior to the MSE wall and a cast-in-place concrete coping on top of the wall.

(vi) MSE walls shall not be constructed over any fluid carrying infrastructure including gas lines and municipal utility infrastructure such as but not limited to, aqueducts, feedermains, forcemains, watermains, land drainage sewer, wastewater sewer, or combined sewer.

(c) The elevation of the top of the retaining wall as noted in C23.1(c) shall be 234.0 m. Based on maintaining existing grades outside of the Lands in accordance with C6.4.3, Project Co will be responsible to design the retaining wall accordingly, including but not limited to, wall type and size, coping shape, and depth of wall. The north face of the retaining wall shall be 0.5 m inside the property line of the Lands. The length of the wall shall be at least 275 m long, taken along the length of the property line and towards the Pembina Highway Underpass. To satisfy geotechnical stability requirements and maintenance of grade exterior to the Lands, Project Co will be responsible to tie the retaining wall system into the retaining wall system along the Pembina Highway Underpass or the substructure of the CN Rail Bridge over Pembina Highway.

C23.10 Durability

C23.10.1 General

(a) Railway structures shall be designed for a service life of 75 years with the exception of MSE walls that shall be designed for a service life of 100 years. The designs shall recognize the need for ease of replacement of components whose service life is expected to be less than 75 years and the provision of access for inspection and OMR Services.

(b) At a minimum, the concrete curing requirements shall be in accordance with Appendix D – Standard Structural Specifications.

(c) Galvanic corrosion should be addressed in areas where dissimilar metals would be in contact. Non-conductive spacers or realignment of structural components should be considered. Reinforcing placement may require adjustment to avoid contact of dissimilar metals. Where reinforcing placement is insufficient to address dissimilar metals contacting, appropriate coating, or material substitutions should be provided.

(d) Project Co shall protect against embrittlement of all galvanized reinforcing. At a minimum, protection shall be in accordance with Appendix D – Standard Structural Specifications .

C23.10.2 Bridge Superstructure

(a) The minimum level of protection for a bridge with a concrete superstructure against deterioration from de-icing salts, freeze-thaw damage and reinforcing corrosion shall consist of:

(i) Structural concrete deck in accordance with Table 11;

(ii) Galvanized steel reinforcing;

(iii) Clear cover of the reinforcing in accordance with Table 13; and

(iv) Deck waterproofing.

(b) The minimum technical requirements for structural concrete, including bridge decks, shall be in accordance with Appendix D – Standard Structural Specifications.

C23.10.3 Bridge Substructure

(a) The minimum level of protection for a bridge substructure against deterioration from de-icing salts, freeze-thaw damage, reinforcing corrosion, and damage from sulphate attack shall consist of:

(i) Structural concrete, in accordance with Table 11, for all of the substructure;

(ii) Galvanized steel reinforcing; and

(iii) Clear cover of the reinforcing in accordance with Table 13.

(b) The minimum technical requirements for structural concrete, including piers and abutments, shall be in accordance with Appendix D – Standard Structural Specifications.

(c) The use of uncoated black steel will be permitted for use in piles, caissons, and footings only. Epoxy coated reinforcing or suitable equal shall be used to transition from uncoated black reinforcing in the caissons, piles, and footings to be galvanized or stainless steel reinforcing in attached structural components.

C23.10.4 Letellier Grade Separation

(a) The minimum level of protection for a tunnel structure against deterioration from de-icing salts, freeze-thaw damage, reinforcing corrosion, and damage from sulphate attack shall consist of:

(i) Structural concrete, in accordance with Table 11;

(ii) Galvanized steel reinforcing; and

(iii) Clear cover of the reinforcing in accordance with Table 13.

(b) Movement of water around and through a tunnel structure should be minimized. At a minimum, the water control should be provided through:

(i) A waterproofing system shall be provided for the tunnel structure. The intent is to provide a multi-layer system capable of withstanding water ingress through the structure over its 75-year design life with no maintenance. The water proofing system shall be robust enough to withstand backfilling operations as well as loadings and movements associated with rail operations;

(ii) All waterproofing systems shall be resistant to fossil fuels;

(iii) A subdrain system shall be provided under the Transitway pavement to collect and remove all water in the pavement base to the City's land drainage system;

(iv) A subdrain system shall be provided on the exterior of the tunnel to remove water from the backfill to the City's land drainage system; and

(v) The number of subdrain penetrations through the tunnel walls should be limited.

(c) The number of construction joints shall be minimized where possible.

C23.10.5 Earth Retaining Structures

(a) Retaining Walls

(i) Subdrains shall be provided for all Type 1 retaining walls as shown in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*. Subdrains shall not project through the vertical portion of the retaining wall and shall be extended to the ends of the retaining wall for capture in the City's land drainage system.

(ii) Subdrains are not required for Type 2 and Type 3 retaining walls as shown in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*, but care should be given to management of surface and groundwater behind the retaining walls.

(b) MSE Walls

(i) For the protection and long term service life of the MSE wall system, drainage and barriers to moisture movement should be considered. At a minimum, all MSE walls shall include the following:

- Drainage system along the interior face of the wall to capture water within the MSE wall system and drain to the City's land drainage system. Refer to *Appendix E – Standard Construction Details*;
- An impervious membrane above the retaining wall fill but below the Transitway structure or railway and barriers to capture water laden with de-icing salts and other contaminants and drain to the City's land drainage system. Refer to *Appendix E – Standard Construction Details*; and
- Cleanout locations along the length of the retaining walls sufficient to provide adequate access for removal of debris and material caught in the

drainage system. All bends in the drainage system piping shall be less than 45° to facilitate cleanout operations.

(ii) The minimum level of protection for MSE walls against deterioration from de-icing salts, freeze-thaw damage, reinforcing corrosion, and damage from sulphate attack shall consist of:

- Structural concrete, in accordance with Table 11,
- Galvanized steel reinforcing; and
- Clear cover of the reinforcing in accordance with Table 13.

(iii) Backfill material shall be compatible with long-term durability and performance of the soil reinforcement and precast concrete panels.

(iv) Where steel reinforcement is used, the reinforcing shall be hot-dip galvanized.

(v) The minimum technical requirements for structural concrete, backfill material, soil reinforcement, and panel reinforcing shall conform to *Appendix D – Standard Structural Specifications*.

C23.10.6 Girders

(a) Structural Steel

(i) The minimum level of protection for structural steel against deterioration and corrosion from de-icing salts, thermal effects, and exterior exposure shall consist of:

- All steel bridge components shall be hot-dip galvanized or zinc metalized. The use of weathering steel will not be permitted; and
- A polyurethane seal coat shall be applied to all hot-dip galvanized and zinc metalized surfaces. Exterior girder surfaces shall have a pigmented coating to ensure a uniform colour and texture.

(b) Pre-cast Concrete Girders

(i) The minimum level of protection for pre-cast concrete girders against deterioration from de-icing salts, freeze-thaw damage and reinforcing corrosion shall consist of:

- Black steel other than the pre-stressing strands will not be permitted; and
- All dowels projecting from pre-cast concrete girders and extending into the concrete bridge deck shall be stainless steel reinforcing.

C23.10.7 Concrete Coatings

(a) After Construction, but prior to Substantial Completion, an approved silane sealer shall be applied to all concrete surfaces which are susceptible to deterioration by water and de-icing salts. The following elements shall be treated:

(i) All structural concrete exposed to salt spray;

(ii) All exposed concrete surfaces of the bridge superstructure;

(iii) Exposed concrete pier surfaces. Sealing for abutments is not required provided they are not susceptible to salt spray;

(iv) Exposed concrete retaining walls and MSE wall panels; and

(v) For tunnel structures, any exposed concrete not including the roof.

(b) Approved silane sealers shall be in accordance with Appendix D – Standard Structural Specifications.

C23.10.8 Steel Coatings

(a) Hot-dip galvanizing shall provide a minimum coating of 600 g/m^2.

(b) Zinc metallizing shall provide a minimum coating thickness of 12 mils.

(c) At a minimum, all structural steel shall be blast cleaned to SSPC:10 prior to hot-dip galvanizing or metallizing.

C23.11 Materials

C23.11.1 Concrete

(a) Supply of concrete shall be in accordance with Appendix D – Standard Structural Specifications.

(b) Table 11 below summarizes the concrete requirements for each component of the railway structures.

Table 11: Minimum Requirements for Hardened Concrete

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Max Agg. Size	Special Requirements	Post Residual Cracking Index
Type 1	Lean Mix Concrete	15 @ 28 Days	S-1	2	20 mm		
Type 2	Caissons, Piles, Footings	35 @ 56 Days	S-1	2	20 mm		
Type 3	Cast-in-Place Culverts, Retaining Walls, Abutment Backwalls, MSE Wall Panels, Pile Caps, Abutment Seats, Tunnel Raft Foundations, Walls and Roof, and Slope Protection	35 @ 28 Days	C-1	1	20 mm		
Type 4	Pier Columns or Shafts, Pier Cap, Diaphragms, Deck Slab, Bridge Curbs and Barriers, and Retaining Wall and MSE Coping	35 @ 28 Days	C-1	1	20 mm	Synthetic Fibres	0.15
Type 5	Precast Concrete	40 @ Release (f'cl) 55 @ 28 Days	C-1	1	14 mm	Maximum Air Void Spacing Factor for Hardened Concrete of 0.23 mm	

C23.11.2 Reinforcing

(a) Reinforcing shall conform to the requirements of Appendix D – Standard Structural Specifications.

(b) Table 12 below summarizes the reinforcing requirements for each component of the railway structures.

Table 12: Reinforcing Type by Component

Component	Type of Steel Reinforcing
Bridge Decks, Barriers, and Curbs.	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Bridge Substructure, Piers, and Abutments.	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Caissons, Piles, and Footings.	Uncoated Black Steel Reinforcement
Between Caissons, Piles and Footings, and Bearing Seats and Pier Shafts/Columns.	Epoxy Coated Steel Reinforcement or Suitable Equal
Culverts and Tunnel Foundation, Walls, and Roof.	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Retaining Walls (including piles, MSE walls, concrete facings and Slope Protection)	Hot-dipped Galvanized Steel Reinforcement or MMFX2 Reinforcement
Pre-cast Concrete Girders	Black Steel Prestressing Strands. Stainless Steel Reinforcing for Dowels into Deck

(c) Epoxy coated reinforcing shall not be used in any locations other than connections between structural components where transitioning from uncoated black to galvanized or stainless steel reinforcing.

(d) The lap length and development length of steel reinforcing shall confirm to the requirements of CAN/CSA S6-14 Canadian Highway Bridge Design Code, CAN/CSA-G30.18-M09, and ASTM A955. At a minimum, the lap length for reinforcing bars shall be 40 d_b, where d_b is diameter of the reinforcing bar.

(e) Table 13 below summarizes the minimum the clear cover of reinforcing for structural concrete:

Table 13: Minimum Reinforcing Cover by Component

Component	Reinforcing Cover
Concrete cast against and permanent in contact with soil	100 mm
Concrete exposed to soil	75 mm
Concrete exposed to de-icing salts	65 mm
Bridge deck top layer	65 mm
Bridge deck bottom layer	50 mm
All other locations	60 mm

C23.11.3 Prestressing Reinforcing

(a) All prestressing strands shall be seven wire uncoated, low relaxation strands, confirming to CSA G279, Grade 1860MPa.

(b) The minimum clear cover for all prestressing strands and reinforcing in precast concrete members shall be 35 mm.

C23.11.4 Structural Steel

(a) All miscellaneous metal shall conform to CAN/CSA G40.21-13, Grade 300W or greater.

(b) Steel H and pipe piles shall conform to the requirements of CAN/CSA G40.21-13, Grade 350W or greater.

(c) Steel for girders receiving hot-dip galvanizing or zinc metalizing shall conform to the requirements of CAN/CSA G40.21-13, Grade 350WT, Category 3 or greater for girders, cover plates, welded attachments, pier and abutment diaphragms, and sole plates. Grade 350W or greater may be used for bracing members bolted to the girders.

(d) For fracture critical members of the steel girders, CAN/CSA G40.21-13, Grade 350WT, Category 5 material shall be utilized.

C23.12 Standard City Details and Specifications

C23.12.1 Unless otherwise approved by the City and CN in writing, the standard details and specifications found in *Appendix D – Standard Structural Specifications* and *Appendix E – Standard Construction Details* shall constitute the minimum requirements for construction of grade separation structures. These specifications may be used by Project Co Parties as a basis for development of the construction specifications as required in C5.1(c).

C23.12.2 Throughout *Appendix D – Standard Structural Specifications*, all references to "Contractor", "Contract Administrator", and "the City" are for consistency with current documents and are not in agreement with the A2 Definitions. All references to "Contractor" shall be interpreted as Project Co, all references to "Contract Administrator" shall be interpreted as Project Co's engineer of record, and all references to "the City" shall be interpreted as the City Representative.

C23.12.3 Throughout *Appendix D – Standard Structural Specifications*, all references to cost, expense, and payment should be ignored and were kept in the specifications for clarity of use and consistency of existing documents.

C23.13 Rail Work Material

C23.13.1 CN will design, supply, install and maintain signals at all at-grade crossings. The signal work shall be coordinated by Project Co with CN and the City Signals department for design interconnections and construction staging. CN will require eight months lead time identified by Project Co to design, supply, and install the signals. Project Co is responsible for Design and Construction of all civil works at the CN signalized crossings.

C23.13.2 CN will supply all rail, rail hardware, ballast, ties, and switches required for the Project to Project Co using their procurement methods. CN will require a six month lead time to order all these materials except switches, which will be a four month lead time.

(a) All mainline rail installed on this project shall be continuous welded rail.

C23.13.3 Project Co will pay CN for all material supplied by CN at the time of order based on CN's actual costs including applicable overheads for the procured materials. Material required for CN Rail Work can be ordered prior to issued for construction drawings.

C23.13.4 All rail material for the Rail Work will be delivered by rail. CN supplied rail material will be unloaded at or near the Project location. If Portage Junction lands are available upon material arrival, CN will stockpile there for offloading by Project Co. If Portage Junction lands are not available, material will be located at the Symington Yard for offloading by Project Co. Project Co shall be responsible for unloading and stockpiling all material.

C23.14 Lighting

C23.14.1 All lighting shall be appropriately designed and installed to provide safety for Infrastructure Users.

C23.14.2 Lighting below a structure and for a tunnel shall be designed to provide minimal lighting transition when traveling through the tunnel in both day-time and night-time conditions, to not cause disruption to the driver.

C23.15 Construction

C23.15.1 Project Co Parties working within CN Rights-of-Way shall adhere to CN safety and work permit requirements respecting safe railway operations, including having the appropriate insurance in place. Project Co Parties performing work within the CN Rights-of-Way shall familiarize themselves with CN's Contractor Safety Package, complete a Contractor Orientation Course and shall be registered on the Contractor Completion Database which can be found at the following website: www.railroadcourses.com. In addition, Project Co Parties working on the project within CN Right-of-Way that is foul of the track shall complete eRailSafe, which can be found at the following website: www.erailsafecanada.com.

C23.15.2 Proponents shall use a Qualified Rail Subcontractor for all Rail Work including the two personnel as approved by CN, who shall not be changed unless otherwise approved by the City Representative, submitted in accordance with Schedule 5 – Review Procedure and subject to CN approval.

C23.15.3 Project Co shall advise CN or their representative as to the dates and times when activities will be conducted within CN Right-of-Way and to provide at least 10 working days advance notice before entering CN Right-of-Way to commence any work for any purpose.

C23.15.4 CN has the right to restrict Project Co's activity on CN Right-of-Way in any way that CN may determine necessary from time to time to assure normal railroad operations or for safety reasons and, after consultation with Project Co, shall also have the right to require Project Co Parties to comply with CN's instructions and take any safety precautions that CN may reasonably determine necessary from time to time.

C23.15.5 Upon completion of the Project, Project Co shall leave the CN Right-of-Way in a clean and tidy condition, free of any environmental contamination resulting from or occurring during the Construction Period.

C23.15.6 Project Co shall prepare work block requests and submit to CN for review and approval prior to undertaking the Rail Work associated with that work block. CN may require Project Co to provide additional information, staging, or scheduling submissions at their discretion for approval of the work block.

C23.15.7 Project Co shall provide 5.4864 m (18') from centerline of the nearest track to any New Infrastructure. At-grade separation locations where the Transitway crosses the CN rail line and the full 5.4864 m (18') clearance cannot be provided; crash protection for CN rail traffic may be required and should be determined in consultation with CN.

C23.16 Utility Infrastructure

C23.16.1 During the Design and Construction, Project Co shall undertake or accommodate Utility Work and Specified Utility Work associated with all Rail Work and New Infrastructure within the CN Right-of-Way. All costs for this work other than as set out in F17 of the Project Agreement shall be borne by Project Co.

C23.16.2 Any Utility Infrastructure within or crossing the CN Right-of-Way that may or may not be impacted by Design and Construction will be the responsibility of Project Co to coordinate the Utility Company, Permits, Agreements, Licences and Approvals, should the Utility Infrastructure need to be moved.

C23.16.3 Should any Utility Infrastructure require casing protection, new or extended, under the rail line, it shall be the responsibility of Project Co.

C23.16.4 CN will design and install all signals for crossings. However, Project Co will be required to coordinate the timing of this design and installation with CN. CN will require a lead time of eight months to design, order, and install the signals, for each crossing.

C23.16.5 CN will design and install the CTC System for the Rivers subdivision. However, Project Co will be required to coordinate the timing of this design and installation with CN. For the purpose of Design and Construction scheduling preparation, CN will require a minimum lead time of eight months to design, order, and install the CTC System.

C23.16.6 CN will decommission the signal crossings for vehicular traffic on Parker Avenue as per C18.5.1(g), and design and install the pedestrian crossing signals. However, Project Co will be required to coordinate the timing of this decommission, design, and installation with CN.

C23.16.7 Project Co will not be permitted to hang any Utility Infrastructure ducts from a CN structure. All Utility Infrastructure should be placed in ducts within the structure, typically located within the trainmans walk. For steel structures, Project Co shall site the Utility Infrastructure ducts in consultation with CN.

C23.17 Flagging

C23.17.1 Project Co will be responsible for the cost of railway protection Flagging on this Project. A Protecting Foreman for Flagging is required for any work within 30 feet of active track, when active equipment can fall or swing to within 30 feet of active track, and/or when there is a possibility that Design and Construction can foul the active track.

C23.17.2 CN will be the sole party responsible for determining the level of protection including the number of Protecting Foreman necessary in order to ensure safe railway operations.

C23.17.3 Project Co will provide 10 business days for CN to identify the requirement for Flagging a minimum of 75 days in advance of commencement of work requiring Flagging. A minimum of 30 days in advance of the requirement for Flagging, CN will advise Project Co whether the CN will provide Protecting Foremen or whether Project Co needs to secure Protecting Foremen directly from a private contractor.

C23.17.4 The list of qualified contract individuals who can be a Protecting Foreman, should CN be unable to provide railway personnel, are as follows:

(a) A & B Rail Services Ltd.;

(b) AV Rail Contracting Ltd.;

(c) Monashee Rail Corp.;

(d) PNR Railworks;

(e) Remcan Projects LP;

(f) Cando Contracting Ltd.; and

(g) Cariboo Central Railway Contracting Ltd.

C23.17.5 Notwithstanding C23.17.4, Project Co may not retain a Protecting Foreman from the same company who is performing Rail Work.

C23.17.6 Project Co will pay CN in advance, quarterly, where CN is providing rail protection Flagging, based on true and accurate invoicing utilizing current rates.

C23.17.7 Project Co may propose alternate Protecting Foreman subject to approval by CN.

C23.17.8 Project Co shall comply with the work stoppage and clearing requirements associated with Rail Work being undertaken. Flagging will be based on the requirements of the "CN General Engineering Instructions" included in *Appendix H – CN Guidelines*, but may be modified at the discretion of the Protecting Foreman.

C23.18 Rail Design

C23.18.1 Track Design Speeds

(a) The Rivers subdivision shall be designed as Class 3; and

(b) The Letellier subdivision shall be designed as Class 2.

C23.18.2 Track Design

(a) All material shall be new;

(b) All rail shall be 136 lb. continuous welded rail (CWR);

(c) All ties shall be 7" x 9" x 8.5' No. 1 Hardwood;

(d) Turnouts may be panelized or unpanelized;

(e) At a minimum, mainline switches for the Letellier subdivision shall be #12;

(f) At a minimum, switches for the Rivers subdivision crossovers shall be #20; and

(g) At a minimum, turnouts in the Fort Rouge yards shall be #10.

C23.18.3 Turnouts will not be permitted on a rail structure. Other design parameters shall be relaxed through discussions with CN to aid in the turnout coming off the structure.

C23.19 Disposal of Rail Work Materials

C23.19.1 All materials removed from the Construction Period Lands shall be sampled for contamination and appropriately disposed of. All costs associated with the coordination, investigation, sampling, and disposal/remediation of contaminated soils shall be borne by Project Co.

C23.19.2 At a minimum soil sampling and disposal shall be in accordance with "Introduction to CN's minimum soil sampling and disposal requirements" included in *Appendix H – CN Guidelines*.

C23.19.3 Project Co may salvage the existing rail materials with the exception of ties which much be disposed of in accordance with C23.19.2.

C23.20 CN Service Roads:

C23.20.1 The existing CN service road north of the CN Rivers subdivision to the west of the Pembina Highway Underpass shall be maintained (i.e., relocated) along the new alignment of the rail line and should be constructed to within 5 m of the face of any retaining walls for the underpass.

C23.20.2 The existing CN service road for the WC02 Spur shall be maintained (i.e., relocated) on the north side of the Transitway Underpass of the CN Wye Tracks and should be constructed to within 5 m of the face of any retaining walls for the underpass.

C23.20.3 South of Bishop Grandin Boulevard along the CN Letellier subdivision, Project Co shall accommodate for a future CN service road beside the rail line.

C24. UNIVERSITY OF MANITOBA

C24.1 The future development of the Fort Garry campus of the University of Manitoba, including the U of M Southwood Lands, is under study as part of a comprehensive planning exercise being conducted by the University of Manitoba.

C24.2 While specific development plans for the Fort Garry campus have yet to be confirmed, the City and the University of Manitoba have agreed to the following scope of work to be undertaken by Project Co on the U of M Southwood Lands:

(a) The Design and Construction of IGF Station (as described in C9.4 and the Project Agreement, and shown in concept in Figure 33 of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report);

(b) The Design and Construction, and OMR Services of a Transitway with an urban cross-section via IGF Station between the Southpark and Pembina Highway intersection and University Crescent, including a new stop in each direction at the intersection of the Transitway at Markham Road in the Southwood Lands (short-term: stop condition with long-term: signalization, completed by Southwood Lands developer) and a new signalized at-grade intersection of the Transitway at University Crescent (as shown in Figure 19 of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report):

(i) Note that the alignment of the Transitway between the Southpark and Pembina Highway intersection and the east-west portion of the University of Manitoba's proposed Southwood Drive is to be located within the future two northbound lanes of the designated right-of-way for the north-south portion of the University of Manitoba's proposed Southwood Drive (as shown in Figure 19 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*).

(c) The Design and Construction, and OMR Services of the Transitway's AT path between the Southpark and Pembina Highway intersection and University Crescent on the alignment shown in Figure 19 of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report;

(d) The Design and Construction of University of Manitoba Station on the north side of Dafoe Road east of the existing station location (as described in C9.5 and shown in concept in Figure 20 (Revised) of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report);

(e) The Design and Construction of a new bus staging terminal near the east end of Dafoe Road (as described in C9.9.4 and shown in concept in Figure 20 (Revised) of the City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report);

(f) The Design and Construction of road improvements (bus loading lanes) to Dafoe Road required for University of Manitoba Station and the new bus staging area near the east end of Dafoe Road;

(g) The Design and Reconstruction of Dafoe Road between Gillson Street and Service 7 Street South, and the Design and Construction of an extension of Dafoe Road from Service 7 Street South to the bus staging area;

(i) The construction limit on the south side of Dafoe Road shall be the back of curb and any additional requirements for constructability.

(h) The installation of new bus stops, as described in C9.6, at Eastbound IGF Station East Access, Near-side University Crescent and Westbound IGF Station East Access, Far-side University Crescent;

(i) The upgrade of bus stops at Northbound University Crescent at Chancellor Matheson Road (Stop 60103) and Westbound Dafoe Road at School of Music (Stop 60105), as described in C9.6;

(j) The procurement and installation of bus stop poles/flags (using Winnipeg Transit standard for pole, flag, and graphics) at new bus stops on Eastbound Dafoe Road opposite the School of Music Stop 60105 and opposite the University of Manitoba Station (photo of bus stop pole/flag standard shown in item 9 of Table 6); and,

(k) The Design and Construction of a 40 m extension of the southbound University Crescent left turn lane to eastbound Dafoe Road.

C24.3 New bus stops at up to four locations on Southwood Drive may be implemented during the OMR Period. The specific locations for these stops and the timing of the implementation will be dependent on the rate of development in the U of M Southwood Lands and will be determined by the City and the University of Manitoba during the OMR Period. The required design elements for these stops are described in C9.6.3. Should the work proceed, it will be done as a Change Order.

C24.4 Proponents are encouraged to consult with the University of Manitoba during Commercially Confidential Meetings about options for innovative strategies relating to the land drainage plan for the Transitway and IGF Station in the U of M Southwood Lands.

C24.5 Construction

C24.5.1 Project Co Parties working within University of Manitoba property shall complete the University of Manitoba's contractor safety program. The University of Manitoba's contractor safety program was created for external contractors performing work on lands owned by the University of Manitoba. The intent of this program is to familiarize contractors and subcontractors with University of Manitoba specific policies and procedures, and how they pertain to their specific scope of work. This is achieved through the mandatory contractor orientation, as well as project start-up meetings. In addition, contractors are expected to identify any risks or liabilities introduced to the University of Manitoba through their intended work that could impact the University of Manitoba, its operations, or its population during their time on campus, and develop strategies to mitigate these potential hazards in what is referred to as a University of Manitoba site specific safety plan that is to be submitted prior to construction work. The contractor safety program is to serve as a complement to Project Co's Safety Plan, including their policies and procedures. The following link has additional information regarding the University of Manitoba's contractor safety program: http://umanitoba.ca/campus/physical_plant/health_safety/contractor/1031.html

C24.6 For any crossings of any pedestrian or utility tunnels or corridors at the University of Manitoba, by permanent or temporary Roadways, Transitways, or other New Infrastructure, adequate protection to accommodate the loading at these crossings, or relocation, shall be designed and constructed, by Project Co, as needed

C24.7 The University of Manitoba will provide a coordinator during this project as a liaison for Design and Construction of the Transitway on the University of Manitoba campus or within the U of M Southwood Lands. Costs for this coordinator are budgeted to be $[redacted] for the duration of the project and shall be borne by Project Co.

28(1)(c)(i)(ii)(iii)

C25. NOISE ATTENUATION

C25.1 Project Co is responsible for all design, manufacturing, handling, and installation of all components of permanent noise attenuation for the New Infrastructure. A noise attenuation wall is required to reduce the noise impacts for residents of Waverley Heights. The noise attenuation wall, incorporating appropriate aesthetics, is to be located near the west property line of the City's feedermain easement (as shown in Figure 10 of the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report*) between the north end of the residential area (opposite Lake Village Road) and Markham Road.

C25.2 Design

C25.2.1 The structural design of the noise attenuation wall shall comply with the requirements of AASHTO.

C25.2.2 Wind loads shall be determined based on values found in the National Building Code with Manitoba amendments.

C25.2.3 The design shall take into consideration Performance Requirements in E6.

C25.2.4 The wall shall be a minimum of 5 m in height.

C25.2.5 Project Co shall determine, design and ensure that all private fence connections to the noise attenuation wall are appropriate and satisfactory to the resident including any parallel fence Demolition. Project Co shall obtain the appropriate consent, in writing, from the property owner to enter onto and complete any work required from inside the resident's property.

C25.2.6 The design of the noise attenuation wall shall take into consideration any utilities in the area, including the feedermain within the Construction Period Lands to the west of the CN Right-of-Way. There may be location and constructability constraints with respect to the feedermain, which shall be discussed with the City Water and Waste Department.

C25.2.7 The design of the noise attenuation wall shall not impede drainage in the public properties to the west of the CN Right-of-Way to the east.

C25.2.8 The noise attenuation wall shall be designed in accordance with the requirements of Appendix R – CPTED Guiding Principles, City of Winnipeg, May 2006.

C25.2.9 The noise wall shall not have any foot holds to aid in its ability to be climbed.

C25.3 Material

C25.3.1 The materials used in the fabrication of noise barrier components shall be capable of providing a screen that is resistant to snow and ice, cycles of freezing and thawing, de-icing agents, soil acidity, frost heave, and ultraviolet radiation. They shall not rust or stain and should require minimal maintenance and be fire resistant.

C25.3.2 If concrete is used, it shall be uncoloured concrete or coloured concrete, textured finish on both sides, with an architectural finish.

C25.3.3 Noise barriers and retaining walls shall be designed to minimize sound reverberations.

C25.4 Installation

C25.4.1 All joints between panels, between panels or segments and uprights, and between the lower panel or segments and the guardrail or soil, as the case may be, shall be sealed to ensure the acoustic effectiveness of the barrier.

C25.4.2 Panels or segments shall be leveled. The noise barrier shall be uniform and shall neither tilt off axis or bow. The wall shall be maintained straight and true and shall not lean more than 25 mm in 1 m in any direction. Elevation alignment (top and bottom) tolerances of the panel or segment shall be no more than 15 mm.

C25.4.3 Installation methods adjacent to the City feedermain shall be discussed in detail with Water and Waste prior to commencing construction of the noise attenuation wall.

C25.4.4 Panels or segments shall be perfectly flat with no bending or arching in either direction.

C26. DEMOLITION

C26.1 Project Co shall demolish, remove and dispose (the "**Demolition**") of all buildings, associated Existing Infrastructure (wells, poles, etc.), other structures or installations located within the Construction Period Lands as outlined in the Technical Requirements. Project Co shall coordinate all Utility Infrastructure disconnections and obtain all required Permits, Licences and Approvals for the Demolition. Project Co shall restore the areas after the Demolition to a landscaped state consistent with the surrounding area. Burial of the demolition materials shall not be allowed.

C26.2 Bridge Demolition shall not take place while traffic is on or below any portion of the existing bridge. A demolition plan and safety plan will be required to be presented to the City Representative prior to any Demolition taking place.

C26.3 Demolition for this Project will be required at, but is not limited to, the following locations:

(a) Existing CN rail bridge over Pembina Highway and retaining/wing walls;

(b) Existing pump station at Pembina Highway Underpass;

(c) Any portion of the existing CN rail bridge over Bishop Grandin Boulevard that is not utilized for the Transitway or Letellier subdivision;

(d) Residence at 1500 Parker Avenue;

(e) Residence at 973/971 Chancellor Drive; and

(f) Residence at 969/967 Chancellor Drive.

C26.4 Demolition shall be in accordance with Appendix D – Standard Structural Specifications.

C27. LANDSCAPING

C27.1 The landscape architectural design in the *City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report* identifies layout, grading and planting/groundcover design for the corridor outside of the Transitway and Roadway surfaces, including connections to pedestrian and bicycle pathways and their integration within the Project.

C27.2 In addition to the general image of the corridor, the landscape design shall address the following issues:

(a) Interconnection between areas on either side of the Transitway corridor and integration of the corridor into regional bicycle and pedestrian pathways;

(b) Seeding will take place in the median and within 6 m of the shoulder using salt-tolerant prairie species to reduce mowing grasses;

(c) Planting diversity using a broad mix of tree and shrub species consistent with the City of Winnipeg Tree Planting Details and Specifications Downtown Area and Regional Streets and Acceptable Tree Species for Boulevard Tree Plantings, to meet compensation required;

(d) Sustainability and reduced need for weed control replacing topsoil with "growing medium";

(e) Salt tolerant grass and hard landscape treatment in medians and areas difficult to maintain as grass; and

(f) Durable, aesthetically pleasing materials used in intersection islands and other areas of paving.

C27.3 The functional design drawings for the corridor include an AT path with connections to adjacent AT networks. Detailed landscape architectural plans should include planting plans and details including pathways and paving stone details at intersections. Plans shall identify existing trees and, where feasible, protect and incorporate existing trees into the final landscape design.

C27.4 The Aesthetics and Landscaping Design Report should also address soil media, planting, seeding and bank stabilization requirements, as well as paving stone and base materials.

C27.5 Grading

C27.5.1 Grading is to be designed to be aesthetically pleasing and shall take into consideration the equipment Project Co will require to safely mow and maintain the slopes.

C27.5.2 Grading is to be designed to provide suitable growing conditions for plant material and to result in no net change in drainage in existing natural areas. Consideration to be given to slope, soil moisture conditions, soil quality, and wind conditions expected throughout the year, including street clearing practices and traffic speeds. Design proposals including trees, shrubs, grasses and herbaceous materials shall at a minimum be constructed and maintained in accordance with:

(a) City of Winnipeg Standard Construction Specifications;

(b) Appendix N – Tree Removal Guidelines, City of Winnipeg, March 1, 2014; and

(c) Tree Planting Details and Specifications Downtown Area and Regional Streets.

C27.6 Preservation and Compensation for Loss of Existing Trees and Natural Areas

C27.6.1 Compensation for the removal of or damage to existing natural areas including ecologically significant lands and urban forestry will be assessed by City of Winnipeg Naturalist, and City Forester, Parks and Open Space Division of the City's Public Works Department. Design plans and calculations shall be submitted in accordance with Schedule 5 – Review Procedure; Parks and Open Space will verify the achievements of compensation for loss of habitat and landscape amenity assets based on the *Appendix N* – Tree Removal Guidelines, City of Winnipeg, March 1, 2014. Compensation for the value of the trees and habitat removed will be offset by new tree planting and new naturalization areas and shall be discussed with the Urban Forestry Branch and Naturalist Branch, City of Winnipeg. The value of the trees and natural areas protected may be calculated from the plans and data.

C27.6.2 Project Co shall prepare a plan showing which tree and natural areas are protected and incorporated into the landscape design. The City Forester and local councillor shall approve all tree removals on the Construction Period Lands.

C27.6.3 Project Co shall include in their Aesthetics and Landscaping Design Report a tree preservation and compensation design which shall include the following items:

(a) A plan showing all trees and natural areas to be protected;

(b) A plan showing where trees and restoration are to be planted; and

28(1)(c)(i)(ii)(iii) (c) A list of the planting proposed by species. E.g., each caliper tree planted $[redacted] (bulb and burlap nursery tree), woodland restoration $[redacted]/$m^2$, and prairie restoration $[redacted]/$m^2$.

C27.6.4 Plantings consistent with the area, submitted in accordance with Schedule 5 – Review Procedure for review by the City Naturalist, shall be re-established in the area of the Manitoba Hydro Right-of-Way.

C27.6.5 The forested areas on the Parker Lands are considered Grade B. The *Appendix N* – Tree Removal Guidelines, City of Winnipeg, March 1, 2014 can be applied for obtaining the value from the forested areas with mature trees, while the Natural Area Appendix N – Tree Removal Guidelines, City of Winnipeg, March 1, 2014 will only be necessary in areas where there are no mature trees. The City will allow compensation for the loss of Grade B natural areas on a cost per square metre basis for trees.

C27.6.6 Further to C27.6.1, should the value of tree, woodland, and natural area removals within City property for the Project exceed the value of new plantings able to be placed within city property for the Project, the difference shall be paid to the City to be used by the Parks and Open Spaces Department or Forestry Department in the adjacent neighbourhoods to offset the removals caused by the Project.

C27.6.7 No compensation is required for the removals and plantings within the shaded areas depicted in Appendix UU – Tree Removals in U of M Southwood Lands and University of Manitoba. The removals within this drawing will be completed by others outside of this project, in a separate project for the City of Winnipeg. As part of that project, the trees will be cut down and removed from the site; however, Project Co will be required to complete the grubbing of the root masses left behind. Project Co will be responsible to provide compensation according to the Technical Requirements for any trees or plantings needing to be removed, outside of the shaded areas depicted in Appendix UU – Tree Removals in U of M Southwood Lands and University of Manitoba.

C27.6.8 No compensation is required for the removal of grassland within the Construction Period Lands. However, requirements within Appendix I – Manitoba Conservation and Water Stewardship Environment Act Licence No. 3121 shall be followed.

C27.7 Topsoil and Seeding

C27.7.1 Topsoil material shall be uniformly spread to a depth of 100 mm over the prepared areas to facilitate the required seeding and landscaping. Under no circumstances shall any existing topsoil be buried, wasted or otherwise disposed of unless contaminated. In the case of large amounts of surplus topsoil, Project Co shall indicate how the material shall be handled and stored in a manner applicable to relevant regulatory requirements. The handling and storage of topsoil is to be included in Project Co's EMS operational procedures. Topsoil may be salvaged and taken off-site to mix at Project Co's landscaper's facility.

C27.7.2 Conventional seeding and/or hydro-seeding shall be carried out at Project Co's discretion to meet the requirements of these specifications related to drainage, erosion and naturalization.

C27.7.3 Seeded areas shall show a uniform stand of grass during the calendar year following the year of initial seeding or re-seeding. Areas which do not show a uniform stand of grass shall be reseeded. A uniform stand of grass will show no bare spots greater than 1 m^2 in size and provide a minimum of 80% ground cover.

C27.7.4 All seed supplied by Project Co shall at a minimum be in accordance with the latest revision of the City of Winnipeg Standard Construction Specifications.

C27.7.5 In order to maintain consistency in vegetation within the Construction Period Lands, seeding and sodding of the Construction Period Lands shall be similar to the surrounding area.

C27.7.6 Topsoil Placement:

(a) Prior to placing topsoil, all sub-grade areas except in areas within a tree protection zone shall be scarified to a minimum depth of 50 mm. Project Co shall use soil scarifying or pulverizing equipment suitable for the area involved.

(b) Grass seed for regional street boulevards, medians and interchange areas, a mixture composed of:

(i) Seventy percent (70%) Fults Alkaligrass (Puccinellia distans) or Nuttall's alkaligrass (Puccinellia nuttalliana);

(ii) Twenty percent (20%) Audubon or Aberdeen Creeping Red Fescue; and

(iii) Ten percent (10%) Perennial Ryegrass.

(c) Grass seed for regional street boulevards, medians and interchange areas shall be sown at a rate of 2.2 kilograms per 100 m^2.

C27.8 Site Clean Up

C27.8.1 During both seeding and OMR Services, all sidewalks, Roadways, approaches, driveways and properties near the seeding operations shall be kept clean at all times by Project Co.

C27.8.2 Upon completion of each activity, Project Co shall immediately remove all excess material and debris from the Lands.

C27.9 Landscape Completion

C27.9.1 Landscaping within the Brenda Leipsic Dog Park shall be adequately rooted and ready for use at Substantial Completion.

C27.9.2 Landscaping for the Stadium Access Works shall be in place prior to the Early Access Deadline.

C27.9.3 Landscaping for the New Infrastructure shall be in place prior to Substantial Completion.

C27.9.4 There shall be no landscaping placed in the Hurst Way right-of-way, along the AT path connecting Waverley Street and Parker Station, or the berm described in C6.4.6.

C28. MISCELLANEOUS ENVIRONMENTAL ISSUES

C28.1 Campsites

C28.1.1 No campsites or sleeping trailers shall be allowed on the Lands and Stage 1 Lands.

C28.2 Burning

C28.2.1 No burning will be allowed on the Lands and Stage 1 Lands.

C28.3 Heritage Find

C28.3.1 Project Co shall retain a Project Archaeological Consultant.

C28.3.2 If heritage material is located during the Design and Construction and soil removal and excavation process, all Design and Construction within 15 m of the discovery area shall cease and Project Co shall immediately contact the City Representative. Project Co will be responsible to also contact the Historic Resources Branch, Manitoba Culture, Heritage and Citizenship and the Project Archaeologist. Project Co will be responsible to determine the nature and extent of the archaeological material and to arrange for its recovery in accordance with the Environmental Act. The archaeological remains shall be recovered by salvage excavation upon authorization of the Project Archaeologist working in concert with the Historical Resources Branch.

C28.3.3 Project Co shall be prepared to continue Design and Construction elsewhere on the Project while the archaeological investigation is on-going.

C28.3.4 Construction and excavation work shall not resume until the Project Archaeologist, in consultation with the Historic Resources Branch, authorizes a resumption of construction and excavation work.

C28.3.5 If human remains are uncovered during the Design and Construction and soil removal or excavation process, all Design and Construction within 15 m of the discovery area shall cease and the Historic Resources Branch and the Project Archaeologist shall be notified immediately. The Historic Resources Branch shall contact the City of Winnipeg Police.

C28.3.6 If the human remains are not considered forensic, (i.e., no foul play suspected) they shall be removed by the Historic Resources Branch. If the remains are considered forensic, the City of Winnipeg Police shall be responsible for their removal.

C28.3.7 Upon completion of the Project the Project Archaeologist shall prepare a report of his findings for the City and the Historic Resources Branch.

C28.4 Pollutants

C28.4.1 Project Co shall ensure that no pollutant occasioned by the Design and Construction of the Project or the OMR Services, including debris from clearing operations, petroleum products from equipment operations and construction refuse, is allowed to enter any water body whether flowing or static.

C28.5 Environmental Licence

C28.5.1 The City has been granted an environmental licence from the Province of Manitoba for this Project which can be found in Appendix I – Manitoba Conservation and Water Stewardship Environment Act Licence No. 3121.

C28.5.2 Project Co will be required to follow the requirements set out in the environmental licence on behalf of the City, except for item 12 referencing the Parker Retention Pond, which will be constructed outside of the scope of this Project, and item 9 referencing the Species at Risk survey, which will be conducted by the City after pre-consultation with Manitoba Conservation and Water Stewardship, and will contain mitigation recommendations for inclusion in an Environmental Protection Plan. Project Co is required to complete the Environmental Protection Plan and obtain the Permit, Licences and Approvals from Manitoba Conservation and Water Stewardship, prior to construction within the Parker Lands.

C28.6 Diamond Grinding

C28.6.1 Slurry Removal

(a) Project Co shall remove and dispose of all grinding slurry from the operations in a manner and at a location to satisfy environmental regulations.

(b) No grinding slurry shall be allowed to flow across lanes occupied by traffic or enter into closed drainage systems.

(c) All grinding slurry shall be disposed of off-site to either:

(i) City of Winnipeg South End Pollution Control Centre snow dump site, or

(ii) City of Winnipeg McPhillips Street snow dump site.

C28.6.2 Slurry Handling

(a) The grinding slurry to be removed from the site shall be collected in water-tight haul units and transported to a disposal facility.

PART D CONSTRUCTION

D1. GENERAL

D1.1 This section covers the construction requirements applicable to the Project.

D1.2 Project Co shall abide by the Neighbourhood Liveability By-law No. 1/2008, as amended, during the Construction Period.

D2. RESPONSIBILITY FOR CONSTRUCTION

D2.1 Project Co is responsible for the supply of all management, professional and technical services, supervision services, construction Quality Control and Quality Assurance services, labour, materials, and equipment for performing all of the duties and obligations necessary for delivering all of the requirements of the Project. Project Co is responsible for obtaining and/or complying with requirements of all Permits, Licences and Approvals required for the Design and Construction of the New Infrastructure.

D2.2 Project Co shall ensure that construction conforms to the requirements of the approved designs. All construction is to reflect a high quality of workmanship and all materials incorporated into Design and Construction shall meet long-term safety, durability and functionality requirements.

D2.3 Changes to the Detailed Design documents during construction shall be submitted to the City Representative in accordance with Schedule 5 – Review Procedure. Any City approved changes to the scope of design requirements will be revised in accordance with the Change Order requirements detailed in Schedule 17 – Change Orders.

D2.4 Project Co is responsible for restoring all areas of the Construction Period Lands and/or drainage system that have been disturbed during Design and Construction of the Project.

D2.5 Project Co is responsible for all Utility Company fees, capital and operating costs (including, but not limited to, electricity, natural gas, street lighting, communications and water and sewer) during the Construction Period.

D2.6 Project Co is responsible for all debris, pothole maintenance, and mechanical leaks and spills during Design and Construction within the Construction Period Lands that are caused by Project Co or if Existing Infrastructure deterioration, with respect to potholes, were accelerated due to Project Co's activities. Furthermore, Project Co shall be responsible for deterioration to all non truck routes used for access and egress to the Construction Period Lands, approved in accordance with C18.3.1(b).

D2.7 It may also be necessary for Project Co to provide maintenance to the Existing Infrastructure, (not including Stage 1 Infrastructure) within the project limits during Design and Construction such as, but not limited to, pothole patching, transitional ramp maintenance, litter control, or street sweeping in order to provide safe passage through the Project if caused by Project Co or accelerated due to Project Co's activities.

D2.8 Project Co is responsible for ensuring that all Existing Infrastructure is adequately protected from both long-term and short-term damage due to Design and Construction.

D3. RESIDENTIAL INSPECTIONS AND VIBRATION MONITORING

D3.1 Through the stakeholders' consultation, home owners and apartment building residents expressed concern that construction activities, relocation of rail lines, and the addition of bus traffic will have a negative impact causing vibration and damage.

D3.2 Project Co shall conduct pre-construction and post-construction residential inspections to alleviate claims during or after Design and Construction of the New Infrastructure as necessary. The Designated Project Co Employee to complete these inspections shall be qualified to undertake this work and have the appropriate Security Clearance Check as outlined in Schedule 22 – Security Clearance Requirements.

D3.3 Following completion of the residential inspections, Project Co shall submit a copy of the information gathered to the City for their records. At a minimum, the following shall be obtained during the residential inspection:

(a) Legal address;

(b) Home owner's name or apartment's contact name;

(c) Date of inspection;

(d) Results of the findings with an appropriate amount of pictures; and,

(e) Signature of the home owner or apartment contact that the inspection was conducted or that they declined the inspection.

D3.4 Project Co shall conduct pre-construction and post-construction vibration monitoring at various locations throughout the Project as necessary to provide information on vibration levels:

(a) Before, during, and after construction;

(b) Before and after the realignment of the CN Letellier rail line; and,

(c) Before and after the Transitway.

D3.5 Damage caused by construction activities will be Project Co's responsibility to fix, repair, and rectify.

D4. AS-BUILT INFORMATION

D4.1 General

D4.1.1 Project Co shall compile and record information on the dimensions and physical characteristics of the New Infrastructure (As-Built Construction Reports).

D4.1.2 The As-Built Construction Reports shall be comprised of the following items:

(a) As-Built CN Rail Infrastructure Construction Report;

(b) As-Built City Structures Construction Report;

(c) As-Built Transitway and Roadway Infrastructure Construction Report;

(d) As-Built Transitway Stations Construction Report;

(e) As-Built Aesthetics and Landscaping Construction Report; and

(f) As-Built Utility Infrastructure Construction Report.

D4.1.3 The As-Built Construction Reports shall include full descriptions of each component or aspect of the Project, including, but not limited to, As-Built Drawings, and inspection and test reports.

D4.1.4 The As-Built Drawings shall reproduce all drawings issued for construction showing all relevant details and changes of the New Infrastructure in CAD format. This shall include, but not be limited to, horizontal and vertical alignments, cross-section elements, plan views, details, staging plans, etc.

D4.2 Submission Requirements

D4.2.1 Submission of As-Built Construction Reports, including As-Built Drawings, shall properly identify the component or aspect of the project included. Where applicable, the structure or station identification number shall be referenced.

D4.2.2 All As-Built Construction Reports shall be sealed in accordance with the requirements of APEGM.

D4.2.3 All As-Built Construction Reports shall be sealed by the Design Manager.

D4.2.4 The As-Built Construction Reports shall be submitted no more than six months after the Substantial Completion Date.

D4.2.5 Six hard copies, properly bookmarked, shall be submitted for the As-Built Construction Reports. 11x17 reductions of the full size As-Built Drawings will be permitted for the hard copies.

D4.2.6 Project Co shall provide six digital copies (i.e., CD, DVD, or HDD) of the As-Built Construction Reports that shall be in PDF format. As-Built Drawings shall be in both AutoCAD (.dwg) format and PDF format.

D4.2.7 In addition to D4.2.5, Project Co shall supply one set of 3 mil matte finish mylar film drawings for all As-Built Drawings for the City's record purposes. Reduced size drawings will not be permitted.

D4.2.8 In addition to D4.2.6 and D4.2.7, As-Built Drawings for all Transitways, Roadways, and AT paths shall also be sent to the City's Representative to be forwarded on to the Public Works Department GIS Specialist in charge of As-Built Drawings, in accordance with the following requirements:

(a) Conform to the Manual for the Production of Construction Drawings for the City of Winnipeg, Works and Operations Division (November 1984);

(b) Be in AutoCAD (.dwg) format and indicate the version used;

(c) Be as-built with dimensions corrected in both text and graphics;

(d) Show pavement dimensions to the "back of curb" (edge of pavement);

(e) Include plot style table;

(f) Be produced in the NAD 83, UTM, ZONE 14, (Global co-ordinate system) Note: Public Works Engineering will provide the Legal Streets Base Layer for the required drawings;

(g) Indicate if a scale factor was or was not used, and if used the scale factor used is to be indicated;

(h) An original signed mylar copy and two digital copies:

(i) Included on the two digital copies shall be a separate drawing in AutoCAD format with the following eight basic layers (none of which shall include text) and a list describing additional layers used:

(ii) Layer Names:

- Street Surface;
- Walk;
- Alley;
- Approach;
- Ramp Curb;
- Dimensions (to include all dimensions in the drawing);
- Drainage Inlets; and
- Elevations (min. all hi & low points).

D4.3 As-Built CN Rail Infrastructure Construction Report

D4.3.1 "**As-Built CN Rail Infrastructure Construction Report**" means an as-built report documenting the method of construction that contains sufficient detail so that an independent reviewer can gain a clear understanding of all Rail Work constructed under this Project. The intent of the as-built report is to highlight how construction was undertaken and summarize all available information for that structure.

D4.3.2 The As-Built CN Rail Infrastructure Construction Report shall consist of a written report and appendices containing all ancillary information related to the construction of the Rail Work, and shall generally include, but not be limited to, the following:

(a) The written report shall have sufficient detail to highlight how construction was undertaken. The written report shall discuss, but not be limited to, the following:

(i) General overview of the structure;

(ii) Demolition of the existing structure, if applicable;

(iii) Temporary works including traffic control, staging, closures;

(iv) Safety appurtenances;

(v) Environmental issues;

(vi) Utility Work and Specified Utility Work including all Utility Infrastructure within the structure and CN Right-of-Way; and

(vii) Each structural component, providing a description, method of work, inspection, and major challenges. Typical components to include are as follows:

- Shoring including temporary and permanent components;
- Excavation;
- Foundations;
- Earth retaining structures;
- Substructure including footings, pile caps, pier shafts and caps, and abutment seats and backwalls;
- Superstructure including bearings, girders, deck, barriers, and expansion joints;
- Rail relocations, connections, and track installation; and
- Brief summary of landscaping or aesthetics at that location.

(b) The appendices shall include, but not limited to, the following:

(i) Any operations and maintenance manuals, programs, or instructions;

(ii) Requests for information or equivalent correspondence method established by the QMS;

(iii) Field instructions or equivalent correspondence method established by the QMS;

(iv) Minutes of meetings in accordance with B9.3;

(v) Site Construction Photographs in accordance with B10;

(vi) Quality Control testing and inspection reports. Typical testing and inspection reports are as follows:

- Testing for concrete mix design acceptance;
- Plastic and hardened concrete testing for concrete placed on site;
- All measurements and data collected as related to the temperature management plan;
- Concrete residual index testing;
- Aggregate sieve, proctor, and compaction testing;
- Girder (steel or pre-cast concrete) fabrication inspections;
- Pre-cast pile fabrication inspections;
- On-site welding testing;
- Pile dynamic analysis testing;
- Galvanized reinforcing (embrittlement) bend tests; and
- Surface preparation and coating inspection.

(vii) Quality Assurance testing and inspection reports. Typical testing and inspection report in accordance with Quality Control items;

(viii) Non-conformance reports;

(ix) As-Built Drawings;

(x) Specifications;

(xi) Daily reports;

(xii) Flagging reports, if applicable;

(xiii) Communication logs between Project Co and CN, if applicable;

(xiv) Field and survey notes; and

(xv) Submittals. Typical submittals to include are as follows:

- Project schedules with respect to that structure;
- List of Project Co Parties;
- Laydown drawings;
- Piling equipment details;
- Pile driving, pile drilling, foundation records;
- Welding procedures;
- Welder qualifications;
- Test reports for Charpy impact, hardness, radiography, ultrasonic, magnetic particle, and dye penetrant testing;
- Heat treatment records;
- Girder profile surveys during construction and haunch determination calculations;
- Concrete mix designs;
- Concrete temperature management plan;
- Reinforcing bar lists and drawings;
- Mill certificates for steel components including reinforcing, piles, pipes and sleeves, miscellaneous metal, pre-stressing and post-tensioning strands, plate and shapes, bolts and connectors, and any other structural steel;
- Product details. For example, emulsion type damp-proofing, geotextiles, paint and coatings, and galvanizing touch-up paint;
- Shoring details;
- Concrete falsework and formwork details;
- All shop drawings from suppliers. For example, girders, bearings, and expansion joints; and
- Girder erection drawings.

(c) Any other information recorded as part of the QMS and required to document material properties or construction details.

D4.3.3 The Detailed Design documents packages provided in accordance with C5 shall also be submitted as part of the As-Built CN Rail Infrastructure Construction Report. Providing as an appendix shall be sufficient.

D4.3.4 Separate reports shall be submitted for each structure.

D4.4 As-Built City Structures Construction Report

D4.4.1 "**As-Built City Structures Construction Report**" means an as-built report documenting the method of construction that contains sufficient detail so that an independent reviewer can gain a clear understanding of all City structures including grade separation structures, major culverts, earth retaining structures and noise attenuation barriers constructed under this Project. The intent of the as-built report is to highlight how construction was undertaken and summarize all available information for that structure.

D4.4.2 The As-Built City Structures Construction Report shall consist of a written report and appendices containing all ancillary information related to the construction of that City structure, and shall generally include, but not be limited to, the following:

(a) The written report shall have sufficient detail to highlight how construction was undertaken. The written report shall discuss, but not be limited to, the following:

(i) General overview of the structure;

(ii) Demolition of the existing structure, if applicable;

(iii) Temporary works including traffic control, staging, closures;

(iv) Safety appurtenances;

(v) Environmental issues;

(vi) Utility Work and Specified Utility Work including all Utility Infrastructure within the structure and approach Roadways footprint; and

(vii) Each structural component, providing a description, method of work, inspection, and major challenges. Typical components to include are as follows:

- Shoring including temporary and permanent components;
- Excavation;
- Foundations;
- Earth retaining structures;
- Substructure including footings, pile caps, pier shafts and caps, and abutment seats and backwalls;
- Superstructure including bearings, girders, deck, barriers, wearing surface, and expansion joints;
- Overhead sign structures; and
- Brief summary of landscaping or aesthetics at that location.

(b) The appendices shall include, but not limited to, the following:

(i) Any operations and maintenance manuals, programs, or instructions;

(ii) Requests for information or equivalent correspondence method established by the QMS;

(iii) Field instructions or equivalent correspondence method established by the QMS;

(iv) Minutes of meetings in accordance with B9.3;

(v) Site Construction Photographs in accordance with B10;

(vi) Quality Control testing and inspection reports. Typical testing and inspection reports are as follows:

- Testing for concrete mix design acceptance;
- Plastic and hardened concrete testing for concrete placed on site;
- All measurements and data collected as related to the temperature management plan.
- Concrete residual index testing;
- Aggregate sieve, proctor, and compaction testing;
- Asphalt Marshall analysis and compaction testing;
- Concrete bridge deck and barrier clear cover surveys;
- Girder (steel or pre-cast concrete) fabrication inspections;
- Pre-cast pile fabrication inspections;
- On-site welding testing;
- Pile dynamic analysis testing;
- Galvanized reinforcing (embrittlement) bend tests; and
- Surface preparation and coating inspection.

(vii) Quality Assurance testing and inspection reports. Typical testing and inspection report in accordance with Quality Control items;

(viii) Non-conformance reports;

(ix) As-Built Drawings;

(x) Specifications;

(xi) Daily reports;

(xii) Field and survey notes; and

(xiii) Submittals. Typical submittals to include are as follows:

- Project schedules with respect to that structure;
- List of Project Co Parties;
- Laydown drawings;
- Piling equipment details;
- Pile driving, pile drilling, foundation records;
- Welding procedures;
- Welder qualifications;
- Test reports for Charpy impact, hardness, radiography, ultrasonic, magnetic particle, and dye penetrant testing;
- Heat treatment records;
- Girder profile surveys during construction and haunch determination calculations;
- Concrete and asphalt mix designs;
- Concrete temperature management plan;
- Reinforcing bar lists and drawings;
- Mill certificates for steel components including reinforcing, piles, pipes and sleeves, miscellaneous metal, pre-stressing and post-tensioning strands, plate and shapes, bolts and connectors, and any other structural steel;
- Product details. For example, emulsion type damp-proofing, geomembranes, geotextiles, paint and coatings, waterproofing membrane, and galvanizing touch-up paint;
- Shoring details;
- Concrete falsework and formwork details;
- All shop drawings from suppliers. For example, MSE walls, girders, bearings, and expansion joints; and
- Girder erection drawings.

(c) Any other information recorded as part of the QMS or required to document material properties or construction details.

D4.4.3 The Detailed Design documents packages provided in accordance with C5 shall also be submitted as part of the As-Built City Structures Construction Report. Providing as an appendix shall be sufficient.

D4.4.4 Separate reports shall be submitted for each structure.

D4.5 As-Built Transitway and Roadway Infrastructure Construction Report

D4.5.1 The "**As-Built Transitway and Roadway Infrastructure Construction Report**" means an as-built report documenting the method of construction that contains sufficient detail so that an independent reviewer can gain a clear understanding of the New Infrastructure of the Transitway, Roadway, AT path, Park and Ride, Kiss and Ride, drainage, municipal utilities, and pump station.

D4.5.2 The As-Built Transitway and Roadway Infrastructure Construction Report shall consist of a written report and appendices containing all ancillary information related to the construction of the Transitway and Roadway infrastructure, and shall generally include, but not be limited to, the following:

(a) The written report shall have sufficient detail to highlight how construction was undertaken. The written report shall discuss, but not be limited to, the following:

(i) General overview;

(ii) Demolitions, if applicable;

(iii) Temporary works including traffic control, staging, closures;

(iv) Safety appurtenances;

(v) Environmental issues;

(vi) Utility Work and Specified Utility Work including all Utility Infrastructure within the infrastructure footprint;

(vii) Each component, providing a description, method of work, inspection, and major challenges. Typical components to include are as follows:

- Excavation;
- Sub-grade compaction;
- Sub-base and base course construction;
- Transitway and Roadway pavement structure and surfacing;
- Overhead sign structures;
- Pump station, mechanical, electrical and building structure;
- Drainage and municipal utilities; and
- Brief summary of landscaping or aesthetics at that location.

(viii) Surfacing information, including, but not limited to:

- Surfacing schedule and key dates;
- All concrete and asphalt mix designs; and
- Width and thickness charts.

(ix) Structural pavement information, including, but not limited to:

- Soil classifications;
- Subgrade additives used, if any (e.g., lime);
- The applicable plans, annotated to show any deviation from the original design;
- The results of any coring or drilling undertaken on the Project;
- The finished surface width (rounded to the nearest 100 mm);
- The constructed sideslope ratios of pavement structure and subgrade as applicable; and
- The constructed pavement structure thickness (rounded to the nearest 5 mm) including:
  - The thickness of each layer; and
  - The type and grade of asphalt cement and/or type and classification of PCC used.

(x) Pump station material information, including, but not limited to:

- Pipe type and supplier;

- Pump type and supplier;
- Mechanical;
- Electrical; and
- Concrete mix designs.

(xi) Include, where applicable, pavement cross-section(s), asphalt supplier, concrete supplier, geotextile used – type, manufacturer and supplier, rock material supplier, and sub-drains used – type, manufacturer and supplier.

(b) The appendices shall include, but not be limited to, the following:

(i) Any operations and maintenance manuals, programs, or instructions;

(ii) Requests for information or equivalent correspondence method established by the QMS;

(iii) Field instructions or equivalent correspondence method established by the QMS;

(iv) Minutes of meetings in accordance with B9.3;

(v) Site Construction Photographs in accordance with B10. Photographs should be provided for key activities;

(vi) Quality Control testing and inspection reports. Typical testing and inspection reports are as follows:

- Testing for concrete mix design acceptance;
- Plastic and hardened concrete testing for concrete placed on site;
- Aggregate sieve, proctor, LA abrasion, and compaction testing; and
- Asphalt Marshall analysis and compaction testing.

(vii) Quality Assurance testing and inspection reports. Typical testing and inspection report in accordance with Quality Control items;

(viii) Non-conformance reports;

(ix) As-Built Drawings;

(x) Specifications;

(xi) Daily reports;

(xii) Field and survey notes; and

(xiii) Submittals. Typical submittals to include are as follows:

- Project schedules with respect to that component;
- List of Project Co Parties;
- Laydown drawings;
- Concrete and asphalt mix designs;
- Product details; and
- All shop drawings from suppliers.

(c) Any other information recorded as part of the QMS or required to document material properties or construction details.

D4.5.3 The Detailed Design documents packages provided in accordance with C5 shall also be submitted as part of the As-Built Transitway and Roadway Infrastructure Construction Report. Providing as an appendix shall be sufficient.

D4.5.4 Separate reports shall be submitted where possible to break up the report into reasonable segments of the Transitway and Roadway Infrastructure.

D4.5.5 All AT path, Park and Rides, Kiss and Rides, drainage, municipal utilities, and pump stations shall be included in the As-Built Transitway and Roadway Infrastructure Construction Report.

D4.6 As-Built Transitway Stations Construction Report

D4.6.1 "**As-Built Transitway Stations Construction Report**" means an as-built report documenting the method of construction that contains sufficient detail so that an independent reviewer can gain a clear understanding of all Transitway stations constructed under this Project. The intent of the as-built report is to highlight how construction was undertaken and summarize all available information for each station.

D4.6.2 The As-Built Transitway Stations Construction Report shall consist of a written report and appendices containing all ancillary information related to the construction of the Transitway stations, and shall generally include, but not be limited to, the following:

(a) The written report shall have sufficient detail to highlight how construction was undertaken. The written report shall discuss, but not be limited to, the following:

(i) General overview;

(ii) Temporary works including traffic control, staging, closures;

(iii) Safety appurtenances;

(iv) Environmental issues;

(v) Utility Work and Specified Utility Work including all Utility Infrastructure within the infrastructure footprint;

(vi) Each component, providing a description, method of work, inspection, and major challenges. Typical components to include are as follows:

- Excavation;
- Piling;
- Slab construction;
- Sub-grade compaction;
- Sub-base and base course construction;
- Site furniture;
- Bike lockers and cycling appurtenances;
- Bus stop poles and flags;
- Shelters, canopies, information kiosks, pylon signs;
- Bus detection system;
- Any other signage; and
- Brief summary of landscaping or aesthetics at that location.

(b) The appendices shall include, but not limited to, the following:

(i) Any operations and maintenance manuals, programs, or instructions;

(ii) Requests for information or equivalent correspondence method established by the QMS;

(iii) Field instructions or equivalent correspondence method established by the QMS;

(iv) Minutes of meetings in accordance with B9.3;

(v) Site Construction Photographs in accordance with B10. Photographs should be provided for key activities;

(vi) Quality Control testing and inspection reports. Typical testing and inspection reports are as follows:

- Testing for concrete mix design acceptance;
- Plastic and hardened concrete testing for concrete placed on site;
- Aggregate sieve, proctor, and compaction testing;
- Asphalt Marshall analysis and compaction testing; and
- Surface preparation and coating inspection.

(vii) Quality Assurance testing and inspection reports. Typical testing and inspection report in accordance with Quality Control items;

(viii) Non-conformance reports;

(ix) As-Built Drawings;

(x) Specifications;

(xi) Daily reports;

(xii) Field and survey notes; and

(xiii) Submittals. Typical submittals to include are as follows:

- Project schedules with respect to that component;
- List of Project Co Parties;
- Laydown drawings;
- Pile drilling, foundation records;
- Mill certificates for steel and aluminum components including reinforcing, piles, pipes and sleeves, miscellaneous metal, plates and shapes, bolts and connectors, and any other structural steel or aluminum;
- Concrete and asphalt mix designs;
- Product details; and
- All shop drawings from suppliers.

(c) Any other information recorded as part of the QMS or required to document material properties or construction details.

D4.6.3 The Detailed Design documents packages provided in accordance with C5 shall also be submitted as part of the As-Built Transitway Stations Construction Report. Providing as an appendix shall be sufficient.

D4.6.4 Separate reports shall be submitted for each station.

D4.7 As-Built Aesthetics and Landscaping Construction Report

D4.7.1 "**As-Built Aesthetics and Landscaping Construction Report**" means an as-built report documenting the method of construction and final layout and configuration that contains sufficient detail so that an independent reviewer can gain a clear understanding of what aesthetic treatments were developed and what landscaping was constructed under this Project. The intent of the as-built report is to highlight how construction was undertaken and summarize all available information for each aesthetic and landscaping element(s).

D4.7.2 The As-Built Aesthetics and Landscaping Construction Report shall consist of a written report and appendices containing all ancillary information related to the construction or development of the aesthetic and landscaping elements, and shall generally include, but not be limited to, the following:

(a) The written report shall have sufficient detail to highlight how construction or development was undertaken;

(b) Any adjustments made to achieve the tree preservation and planting requirements in C27.6 including, but not limited to:

(i) Number, size and types of trees and shrubs removed; and

(ii) Number, size and types of trees, shrubs, and grasses planted.

(c) The appendices shall include, but not limited to, the following:

(i) Requests for information or equivalent correspondence method established by the QMS;

(ii) Field instructions or equivalent correspondence method established by the QMS;

(iii) Minutes of meetings in accordance with B9.3;

(iv) Site Construction Photographs in accordance with B10. Photographs should be provided for key activities;

(v) If applicable, Quality Control testing and inspection reports;

(vi) If applicable, Quality Assurance testing and inspection reports;

(vii) Non-conformance reports;

(viii) As-Built Drawings; and

(ix) Specifications.

(d) Any other information recorded as part of the QMS or required to document material properties or construction details.

D4.7.3 The Detailed Design documents packages provided in accordance with C5 shall also be submitted as part of the As-Built Aesthetics and Landscaping Construction Report. Providing as an appendix shall be sufficient.

D4.8 As-Built Utility Infrastructure Construction Report

D4.8.1 "**As-Built Utility Infrastructure Construction Report**" means an as-built report documenting the method of construction that contains sufficient detail so that an independent reviewer can gain a clear understanding of all Utility Infrastructure, including both Utility Work and Specified Utility Work, constructed under this Project. The intent of the as-built report is to highlight how construction was undertaken and summarize all available information for the Utility Infrastructure.

D4.8.2 For the Utility Work noted in C21.1(a), Project Co shall prepare the As-Built Utility Infrastructure Construction Report which shall consist of a written report and appendices containing all ancillary information related to the construction of that Utility Infrastructure, and shall generally include, but not be limited to, the following:

(a) The written report shall have sufficient detail to highlight how construction was undertaken;

(b) The appendices shall include, but not limited to, the following:

(i) Any operations and maintenance manuals, programs, or instructions;

(ii) Requests for information or equivalent correspondence method established by the QMS;

(iii) Field instructions or equivalent correspondence method established by the QMS;

(iv) Minutes of meetings in accordance with B9.3;

(v) Site Construction Photographs in accordance with B10;

(vi) If applicable, Quality Control testing and inspection reports;

(vii) If applicable, Quality Assurance testing and inspection reports;

(viii) Non-conformance reports;

(ix) As-Built Drawings;

(x) Specifications;

(xi) Daily reports;

(xii) Field and survey notes; and

(xiii) Submittals.

(c) Any other information recorded as part of the QMS or required to document material properties or construction details.

D4.9 The Detailed Design documents packages provided in accordance with C5 shall also be submitted as part of the As-Built Utility Infrastructure Construction Report. Providing as an appendix shall be sufficient.

D4.10 For the Utility Work noted in C21.1(b) through C21.1(i), Project Co shall prepare the As-Built Utility Infrastructure Construction Report which shall consist of a written summary report and appendices containing general information related to the construction of that Utility Infrastructure and shall include, but not be limited to, the following:

(a) The written report shall have sufficient detail the scope of work for the construction of the Utility Infrastructure and general schedule of the design and construction.

(b) The appendices shall include, but not limited to, the following:

(i) As-Built Drawings

D5. TEMPORARY INFRASTRUCTURE SIGNS DURING CONSTRUCTION

D5.1 Project Co will supply four sets of infrastructure signs, each approximately 120 cm high by 250 cm wide, for each direction of traffic. Infrastructure sign support structures shall be designed by Project Co to withstand the outside elements for the duration of the Project. Project Co shall mount each sign securely to a suitable rigid sign support backing material and erect each sign to a suitable sign support structure visible to motorists at Pembina Highway and Jubilee Avenue, McGillivray Boulevard and the Transitway crossing, Bishop Grandin Boulevard and the Transitway crossing, and at University Crescent and the IGF Station, or at locations directed by the City.

D5.2 When Project Co has achieved Final Completion of the Project, Project Co shall remove and dispose of the signs and sign support structures.

D6. SITE OFFICE TRAILER

D6.1 Project Co shall provide an office space, conforming to D6.2, for the exclusive use of the City or its representatives at each of the following locations:

D6.1.1 One in a location central to the overall project. The intent is that this office space would be used as a base of operations for the City and City Advisor for the entire Project.

D6.1.2 One at each of the grade separation structures.

(a) For the bridges on Pembina Highway and underpass of the CN Wye tracks, it may be permitted to supply a single office space if approved by the City.

(b) For the bridges on Bishop Grandin Boulevard, it may be permitted to supply a single office space if approved by the City.

D6.2 The office spaces for the City or City Advisor shall meet the following requirements:

(a) The office shall have a minimum floor area of 45 m^2 with numerous windows and a front and rear door entrance with suitable locks;

(b) The office shall be suitable for all weather use. It shall be equipped with a heater and air conditioning so that the room temperature can be maintained between 16-18°C or 24-25°C;

(c) The office shall be furnished with two desks and one table of sufficient size for the review of A1 size drawings as well as table(s) and chairs to hold meetings for up to 16 people;

(d) The office shall be adequately lighted and have numerous wall outlets; and

(e) A medium sized fridge, microwave, and water cooler with disposable cups shall be provided.

D6.3 The office may be located within Project Co's or Project Co Parties' trailers or buildings if agreed upon in writing by the City.

D6.4 The office facilities shall be provided from the date of the commencement of the Construction Period to the Substantial Completion Date or as agreed upon in writing by the City.

D6.5 Two portable washroom facilities shall be provided for the exclusive use of the City and the City Advisor, including one for females only.

(a) The operation of the toilets shall be maintained.

D6.6 The site trailer and the toilets shall be cleaned on a weekly basis immediately prior to each site meeting. The City Representative may request additional cleaning when they deem it necessary.

D6.7 Project Co shall provide seven parking stalls, in close proximity to the field office, for the exclusive use of the City.

D7. ORDER OF CONSTRUCTION

D7.1 The order of Design and Construction for this Project shall be the responsibility of Project Co to determine to allow a smooth completion of construction, except as identified below.

D7.2 Stadium Access Works

D7.2.1 The Stadium Access Works means the Design and Construction of IGF Station including, but not limited to, the IGF Station platform, ramp, connection to Investors Group Field and any Related Infrastructure including AT path. The limits of the Stadium Access Works within the U of M Southwood Lands are from the intersection of Pembina Highway and Southpark Drive to the intersection of the Transitway and University Crescent and shall include the following items of work:

(a) The Design and Construction of IGF Station as described in C24.2;

(b) The applicable work on University Crescent and Dysart Road intersection to allow access from University Crescent southbound into the IGF Station, which is where excess buses will be stored for use on event days;

(c) All applicable work at the Pembina Highway and Southpark Drive intersection needed to allow buses to perform southbound to eastbound movements and westbound to northbound movements efficiently;

(d) Utility relocations;

(e) Transitway lighting between Pembina Highway and IGF Station;

(f) Land drainage systems;

(g) Line painting;

(h) Landscaping;

(i) Fencing and fencing modifications; and

(j) AT path from Pembina Highway to Investors Group Field.

D7.2.2 The Stadium Access Works shall be completed to allow for full operation of IGF Station by the Early Access Deadline in accordance with the Project Agreement.

D7.2.3 Maintenance and Traffic Management after the completion of the Stadium Access Works shall be as described in E1.9.8.

D7.2.4 The Stadium Access Works shall not require the IGF Station East Access bus stop to be completed by the Early Access Deadline; however, access will be required for the NHL Heritage Classic as outlined below and Project Co shall consider the construction of the IGF Station east access as an opportunity to meet these requirements.

D7.2.5 The NHL is planning an NHL Heritage Classic hockey game at IGF Stadium during the 2016/2017 season. This game is planned for October 23, 2016 and the alumni game on October 22, 2016. In relation to the NHL Heritage Classic, Project Co shall:

(a) provide for the coordination and scheduling of the NHL Heritage Classic with the organizers of the NHL Heritage Classic with respect to the Stadium Access Works to be performed under this Project Agreement;

(b) provide the organizers of the NHL Heritage Classic with reasonable opportunity to introduce and store their products and use their construction machinery and equipment on or around the Early Access Site to execute the NHL Heritage Classic events from October 1 – 27, 2016;

(i) Further to the above, Project Co shall allow access to the ice plant or Project Co shall allow the NHL Heritage Classic organizers to build a gravel access from University Crescent to the ice plant; and;

(ii) Project Co shall provide the NHL Heritage Classic organizers with unimpeded access and exclusive use of the area depicted in Appendix YY – NHL Heritage Classic Ice Plant Access Detail for the placement of material and the parking of material, storage containers and semi-truck trailers or other unimpeded access agreed upon by both Project Co and the NHL Heritage Classic organizers.

(c) collaborate with the NHL Heritage Classic organizers in reviewing their mobilization/demobilization schedules when directed to do so by the City;

(d) where part of the Stadium Access Works is affected by the NHL Heritage Classic execution activities, promptly report to the City Representative, in writing, any readily apparent material impacts from the NHL Heritage Classic execution activities. Failure by Project Co to so report shall invalidate any claims against the City by reason of such readily apparent material impacts;

(e) assume overall responsibility as "prime contractor" for compliance with all aspects of Applicable Law relating to health and safety in respect of the Early Access Site;

(f) respond to the NHL Heritage Classic organizers in a timely manner so as not to delay the planning, scheduling or implementation of the NHL Heritage Classic execution, provided that the NHL Heritage Classic organizers provide sufficient notice of their requirements to Project Co to enable Project Co to provide timely response without affecting the Stadium Access Works; and

(g) adhere to the traffic management requirements outlined in C18.9 for the dates of the NHL Hertiage Classic game and the alumni game.

D7.2.6 The work identified in Appendix NN – Access for Semi-Trailers for IGF Events is excluded from the Stadium Access Works. Furthermore, this work shall not commence prior to October 27, 2016 but must be completed prior to Substantial Completion.

D8. MOBILIZATION AND DEMOBILIZATION

D8.1 Mobilization shall not commence prior to Commercial Close.

D8.2 Demobilization shall be complete prior to Final Completion.

D8.3 Site Inspection

D8.3.1 Prior to Mobilization, Project Co shall inspect the Construction Period Lands with the City to verify existing condition of the Construction Period Lands:

(a) Project Co shall prepare inspection reports and take detailed photographs of the site inspection, which shall be identified with the information as set out in B10; and

(b) Project Co shall submit the inspection reports and photographs in accordance Schedule 5 – Review Procedure. Mobilization shall not commence until the Review Procedure has concluded.

D8.3.2 After Demobilization, Project Co shall inspect the Construction Period Lands with the City to confirm the Construction Period Lands have been restored to their original condition prior to Mobilization.

D8.4 Secure Site Fencing

D8.4.1 Project Co shall install a minimum 1.8 m high metal secure fence around any site lay-down and site areas prior to commencement of construction activities. The intent is to locate these around select areas where Project Co selects to place equipment, materials, office compounds and especially hazardous areas.

D8.4.2 Project Co may elect to use fixed barriers to limit access to portions of the construction activities. For example, at the ends of a roadway segment to restrict access to vehicular traffic.

D8.4.3 It is not necessary to place fencing along the entire length of construction activities. However the secure fence and/or barricades shall be located and installed to ensure the safety of the Infrastructure User at all times.

D8.4.4 The fencing shall remain secure and in place throughout the Construction Period.

D8.4.5 The fencing shall be removed during Demobilization.

D8.5 Traffic Gates

D8.5.1 Project Co shall supply, install, maintain, and remove steel gates to keep the Infrastructure User out of the Construction Period Lands, which shall be installed prior to commencement of construction activities.

D8.5.2 The gates shall remain secure and in place throughout the Construction Period.

D8.5.3 The gates shall be removed during Demobilization.

D8.6 Access Roadway

D8.6.1 Project Co shall maintain any access roadway they install.

D8.6.2 The access road shall be maintained on a regular basis to provide continual unrestricted site access, to the satisfaction of the City.

D8.6.3 The access roadways shall be removed during Demobilization and the area shall be restored to its original condition.

D8.7 Restoration of Construction Period Lands

D8.7.1 Upon Substantial Completion, Project Co shall restore the Construction Period Lands to their original condition.

D8.7.2 Where a component of the Project is complete prior to Substantial Completion and Project Co has demobilized from that area, it is not necessary to wait for Substantial Completion to proceed with restoration efforts. However, if additional construction efforts are required to address deficiencies not rectified prior to demobilizing, identified during commissioning, or identified during the certification of Substantial Completion, Project Co will be responsible to restore the Construction Period Lands caused by damage from the additional construction efforts.

D8.7.3 Any deficiencies noted during the site inspections to confirm the restoration efforts, as outlined in D8.3.2, shall be rectified by Project Co prior to Final Completion.

D8.7.4 If the Termination Date occurs before the Expiry Date, then Project Co shall have 30 days to demobilize and vacate the Lands and, if applicable, the Stage 1 Lands.

D8.8 Safety

D8.8.1 Project Co shall adequately plan and undertake Mobilization and Demobilization to ensure the safety of the Infrastructure User is maintained at all times.

D8.8.2 Project Co shall provide temporary signage, fencing, barricades, flagpersons or security personnel as required when Mobilization and Demobilization is underway and the safety of the Infrastructure User could be at risk from interim conditions of the construction efforts.

D9. ADJACENT BUSINESS AND RESIDENTIAL PROPERTY

D9.1 Project Co is responsible for Design and Construction of all Related Infrastructure to accommodate adjacent businesses and residential properties where the New Infrastructure would affect these properties and where easements or expropriations have been identified in Schedule 12 – Lands and Identified Encumbrances.

D9.2 Project Co shall conduct pre-construction and post-construction business and residential inspections to alleviate claims during or after Design and Construction of the New Infrastructure as necessary. The Designated Project Co Employee to complete these inspections shall be qualified to undertake this work and have the appropriate Security Clearance Check as outlined in Schedule 22 – Security Clearance Requirements.

D9.3 Following completion of the business and residential inspections, Project Co shall submit a copy of the information gathered to the City for their records. At a minimum, the following shall be obtained during the business and residential inspections:

(a) Legal address;

(b) Property owner's name;

(c) Business owner's name, if different from the Property owner's name;

(d) Date of inspection;

(e) Results of the findings with an appropriate amount of pictures; and

(f) Signature of the property owner that the inspection was conducted or that they declined the inspection.

D9.4 Design and Construction of Related Infrastructure, in accordance with D9.1, shall be completed in consultation with the property owner.

(a) Further to D9.4, Project Co shall provide adequate notice to property owners of upcoming Design and Construction being undertaken on or immediately adjacent to their property;

(b) Where the Design and Construction of Related Infrastructure would impact any structures, signage, landscaping, and appurtenances, Project Co shall provide information to the property owners on the construction activities being undertaken, methods to maintain access, if necessary, and proposed methods of mitigating potential damage to their property;

(c) In areas of developed landscaping, signage, or appurtenances, Project Co shall be responsible for restoring or reconstructing the affected landscaping, signage, and appurtenances to an equal or better condition; and

(d) Restoration efforts may necessitate new construction. Project Co shall avoid segmented restoration such that it appears as patch work repair.

D9.5 Any damage to adjacent businesses and residential properties shall be the responsibility of Project Co and shall be restored to the satisfaction of the property owner and generally to an equal or better condition.

D9.6 Project Co is responsible for relocation and construction of Utility Infrastructure to accommodate the Related Infrastructure.

D9.7 Project Co is encouraged to utilize innovative construction techniques to minimize impacts with adjacent businesses and residential properties, especially where adjacent structures may be affected.

D9.8 Access for use of existing facilities for adjacent businesses and residential properties shall be maintained.

D9.9 Access for emergency services shall be maintained at all times.

D10. SEWER INSPECTION

D10.1 Project Co shall conduct pre-construction and post-construction Closed Circuit Television (CCTV) inspection and assessment of all combined, wastewater, land drainage, storm relief sewers and manholes within the Construction Period Lands where New Infrastructure is crossing or will be built within a horizontal distance of 10 m to assess the effects of the construction on the existing municipal infrastructure.

D10.2 Any differential defects found between the pre-construction and post-construction CCTV inspection shall be rectified by Project Co prior to Substantial Completion.

D10.3 CCTV inspection general guidelines:

(a) CW 2140 Sewer and Manhole Cleaning and CW 2145 Sewer and Manhole Inspection shall apply;

(b) Televise sewers and manholes if no previous CCTV inspections have been completed; and,

(c) Televise all CB leads to be reused.

PART E OPERATIONS, MAINTENANCE AND REHABILITATION SERVICES

E1. GENERAL

E1.1 This section covers OMR Services applicable to the Project. The requirements to be met in the OMR Services of the OMR Infrastructure during the OMR Period shall conform to the Technical Requirements, as well as those of Project Co's OMR Plan (forming part of Schedule 4 – Project Co's Management Systems and Plans to the Project Agreement).

E1.2 Project Co shall be required to maintain the OMR Infrastructure in a safe and effective operating condition at all times during the OMR Period. This will require Operational Maintenance, Preventative Maintenance, and Rehabilitative Maintenance during the OMR Period.

E1.3 Project Co shall abide by the Neighbourhood Liveability By-law No. 1/2008, as amended, during the OMR Period.

E1.4 It may also be necessary for Project Co to include provisions in the OMR Plan to address deficiencies not specifically identified in the Technical Requirements but which are required for the safety of the Infrastructure User or are recognized by the industry as a normal industry practice.

E1.5 The OMR Plan (B12) shall include details on how the OMR Infrastructure inspection requirements, Operational Maintenance, Preventative Maintenance, and Rehabilitative Maintenance will be carried out and reported back to the City.

E1.6 A report documenting the inspections, Operational Maintenance, Preventative Maintenance, and Rehabilitative Maintenance activities that occurred within the month (**OMR Monthly Report**) shall be submitted to the City Representative by the 15th of the following month, and shall, at a minimum, include the following:

(a) Inspections:
  (i) A summary of the inspections completed;
  (ii) A summary of the findings, deficiencies, issues, etc. determined during the inspections;
  (iii) A summary and the results of any testing completed;
  (iv) Status of audit reports;
  (v) A summary of key events taking place on the OMR Infrastructure; and
  (vi) A summary of any public calls or complaints that were received or addressed by Project Co.

(b) Operational Maintenance:
  (i) A summary of the activities completed during the Operational Maintenance;
  (ii) A summary of any issues determined during the Operational Maintenance; and
  (iii) A summary of reporting compliance to the QMS, EMS, and Safety Plan.

(c) Preventative Maintenance:
  (i) A summary of the activities completed during the Preventative Maintenance;
  (ii) A summary of any issues determined during the Preventative Maintenance; and
  (iii) A summary of reporting compliance to the QMS, EMS, and Safety Plan.

(d) Rehabilitative Maintenance:
  (i) A summary of the activities completed during the Rehabilitative Maintenance;
  (ii) A summary of any issues determined during the Rehabilitative Maintenance; and
  (iii) A summary of reporting compliance to the QMS, EMS, and Safety Plan.

E1.7 Project Co shall pursue any Permits, Licences and Approvals or other review procedures from Manitoba Hydro, CN, the University of Manitoba, or any other entity that may be required in order to complete OMR Services on the OMR Infrastructure.

E1.8 Responsibility for Commissioning

E1.8.1 Project Co is responsible for the transition of the New Infrastructure for the commissioning of its use by the City of Winnipeg as outlined in the Commissioning Plan in section B11. The performance requirements set out in PART C and PART D represents the requirements that shall be met for the Substantial and Final Completion of the Design and Construction of the New Infrastructure.

E1.9 Responsibility for Maintenance

E1.9.1 Project Co is responsible for the supply of all management, supervision, professional and technical services, Quality Control and assurance, labour, materials, utilities and equipment for performing all of the duties and obligations to maintain the OMR Infrastructure during the OMR Period.

E1.9.2 Meetings during the OMR Period shall be held in accordance with the requirements set out for the ORM Committee as outlined in the Project Agreement.

E1.9.3 The performance requirements described in the Technical Requirements represent the requirements that shall be met throughout the OMR Period. Project Co shall measure and report on the OMR Infrastructure and assure compliance to the performance requirements throughout the OMR Period as described herein. Where specific performance requirements are not given, Project Co is expected to use Good Industry Practice to maintain the OMR Infrastructure to a standard of safety, effectiveness and operation equal to, or better than, what is currently being provided on other facilities of similar age and type in the City of Winnipeg.

E1.9.4 Not included in Project Co's OMR Services shall be the following Maintenance-Exempt Work, which shall have a Warranty Period in accordance with F15 of the Project Agreement:

(a) Rail Work,

(i) Including rail and rail bed, but excluding the Letellier Grade Separation and AT Path Connection to Hopewell Lands and any associated works including, but not limited to, Transitway, AT path, drainage, lighting, and earth retaining structures; and

(ii) Including the rail, rail bed, CN Rail Bridge over Transitway at the CN Wye (CN Letellier), and CN Rail Bridge over Transitway at the CN Wye (WC02 Spur) but excluding the Transitway Underpass of CN Wye Tracks and any associated works including, but not limited to, Transitway, AT path, drainage, lighting, and earth retaining structures.

(iii) Including the rail, rail bed, CN Rail Bridge over Pembina Highway and CN Rail Bridge over Bishop Grandin Boulevard.

(b) The following Roadways:

(i) Parker Avenue from Daniel Street to Planet Street and Planet Street from Parker Avenue to the first back lane south of Parker Avenue;

(ii) Clarence Avenue, excluding the Transitway;

(iii) Chevrier Boulevard, excluding the Transitway;

(iv) French Street and adjacent Roadway turnaround;

(v) Chancellor Drive, excluding the Transitway;

(vi) Markham Road; and,

(vii) Pembina Highway intersection with Southpark Boulevard.

(c) The Brenda Leipsic Dog Park;

(d) The parking lot at 1260 Clarence Avenue;

(e) The apartment parking lots on the east side of the Transitway between Markham Road and Southpark Drive and just north of Chancellor Drive;

(f) All New Infrastructure between the intersection of the Transitway and University Crescent and the University of Manitoba bus staging area, including the New Infrastructure on University Crescent; and,

(g) Utility Work and Specified Utility Work except for C21.1 (a), (e), (f), (g), (h), and C21.2(d)(ii) and (iii).

(h) The semi-truck access and west access point described in C9.4.1(h).

E1.9.5 Further to E1.9.4(a), all bearings for Rail structures shall have a 5 year warranty.

E1.9.6 Stage 1 Infrastructure, not including street lighting, shall be included in the inspection requirements and Operational Maintenance. For clarity, Preventative Maintenance and Rehabilitative Maintenance is not required for the Stage 1 Infrastructure. Note that native grasses within the Stage 1 Lands are not to be mowed.

E1.9.7 The following items shall be excluded from Operational Maintenance:

(a) Snow clearing, snow hauling, sanding, salting, sweeping and line painting of the Pembina Highway Underpass Roadway, not AT path;

(b) Landscaping and litter control within the Pembina Highway Underpass right-of-way;

(c) Pre-event and post-event cleaning, litter control and litter pick up for the IGF Station and IGF Station access and egress for the following periods:

(i) Between the Early Access Deadline and Substantial Completion; and

(ii) OMR Period.

(d) Mechanical, HVAC, electrical, and other systems for Osborne Station; and

(e) Snow clearing, snow hauling, sanding, salting, sweeping and line painting of Hurst Way/Asquith Avenue and AT path from Waverley Street to Parker Station.

E1.9.8 Stadium Access Maintenance means the maintenance that will take place on the Stadium Access Works including all inspection requirements, Operational Maintenance, Preventative Maintenance and Rehabilitative Maintenance as described in this section, required for Early Access Events, during the period between the Early Access Deadline and the OMR Period, excluding the maintenance as described in E1.9.7(c). Stadium Access Maintenance shall not cause to alter the duration of the OMR Period for the Stadium Access Works. All costs for Stadium Access Maintenance shall be borne by Project Co, including any insurance requirements.

(a) Included in the Stadium Access Maintenance is the requirement for Project Co to provide Traffic Management during an Early Access Event and during times when there is not an Early Access Event. This shall include, but is not limited to:

(i) Placing permanent concrete barriers to prevent access from Pembina Highway onto the Transitway opposite Southpark Drive when there is no Early Access Event, and removing them when there is an Early Access Event;

(ii) Placing permanent concrete barriers and advance warning signs to prevent access from Markham Road onto the Transitway within the Southwood Lands when there is an Early Access Event, and removing them from Markham Road and placing them on the Transitway to allow Infrastructure Users to travel on Markham Road across the Transitway and not access the Transitway when there is no Early Access Event; and

(iii) Placing permanent concrete barriers to prevent access from University Crescent onto the Transitway until Substantial Completion.

E1.10 Imminent Danger

E1.10.1 For the purposes of this section, Imminent Danger means a safety hazard that may be encountered by any Infrastructure User due to an accident, debris on road, a damaged or deteriorated condition, or any other abnormal occurrence on the OMR Infrastructure.

E1.10.2 In instances where Project Co and/or the City determines an Imminent Danger exists on the OMR Infrastructure, Project Co shall have representation within the road right-of-way, en-route to the Imminent Danger, within 30 minutes of becoming aware of, or of the time Project Co should have been aware of, the Imminent Danger and shall immediately initiate action to protect Infrastructure Users from the Imminent Danger and shall continue the action until the Imminent Danger is eliminated. This action may take the form of a temporary solution, including the closing of traffic lanes, until permanent repairs are able to be undertaken or the Imminent Danger is removed. The responsibility for the repair of the cause of the Imminent Danger shall be governed by the Project Agreement and the other applicable provisions of the Technical Requirements.

E1.10.3 Accepted Lane Closures are defined as Lane Closures on the OMR Infrastructure during the OMR Period for OMR Services not caused by the negligence of Project Co or those for whom Project Co is responsible at law, but instead arising from:

(a) An emergency services instruction, provided such instruction did not result directly from action or inaction by Project Co and that Project Co took all reasonable steps to mitigate the impact of such instruction;

(b) An accident that did not result directly from action or inaction by Project Co and that Project Co took all reasonable steps to mitigate the impact of such accident after all emergency services attending to such accident have vacated the scene;

(c) A company, agency or the City exercising its legal rights to access the OMR Infrastructure where (i) such access is not connected to the obligations of Project Co under the Project Agreement (ii) such access did not result from action or inaction by Project Co, (iii) such access did not result from the City exercising its step-in rights in accordance with the Project Agreement and (iv) Project Co took all reasonable steps to mitigate the impact of such access;

(d) Repairs to the OMR Infrastructure caused by City Parties and by third party damage provided all reasonable steps are being taken to complete the repairs in accordance with Project Co's obligations; or

(e) A direction of the City or the performing of the City's obligations under the Project Agreement.

E1.11 Lane Closure

E1.11.1 Under no circumstance during the OMR Period, other than Accepted Lane Closures, shall Project Co:

(a) Close all lanes in both directions on a Roadway or Transitway regardless of the number of lanes; or

(b) Close two lanes in any one direction for a Roadway with two lanes in each direction; or

(c) Close three lanes in any one direction or two lanes in each direction for a Roadway with three lanes in each direction.

E1.11.2 Further to E1.11.1, under no circumstance during the OMR Period shall Project Co implement measures to require or seek to encourage Infrastructure Users to use an alternative route away from the OMR Infrastructure.

E1.11.3 If as a result of an accident or extreme event, the need arises to use signs or other measures to require Infrastructure Users to use an alternative route away from the OMR Infrastructure, Project Co may effect such measures, provided that Project Co shall as soon as reasonably practicable advise the City of such measures and the reasons therefore. Project Co shall take all reasonable steps to minimize the duration of such measures. Communication between Project Co and the City shall be in accordance with Schedule 13 – Traffic Management.

E1.11.4 Within 60 days of the Substantial Completion Date, Project Co shall submit to the City Representative in accordance with the Review Procedure as set out in Schedule 5 – Review Procedure to the Project Agreement, a schedule for Lane Closures in respect of the OMR Services for the first 12 month period after the Substantial Completion Date (the Agreement

Year) and the next succeeding Agreement Year. No later than May 20 in each Agreement Year after the first Agreement Year, Project Co shall submit to the City in accordance with the Review Procedure a schedule for Lane Closures in respect of the OMR Services for the next succeeding Agreement Year. Each "Schedule of Lane Closures" shall give details of the proposed lanes of Lane Closure, start and end dates for each period of Lane Closure, and the OMR Services to be carried out. Preventative and Rehabilitative Maintenance shall only be completed on the Transitway during the months of May until August. All Preventative and Rehabilitative Maintenance shall be completed prior to August 31.

E1.11.5 Project Co shall inform the City Representative and the City Transit Department (Chief Inspector, currently held by George Fatouros at 204-986-5745 or e-mail at gfatouros@winnipeg.ca) of any changes to the Schedule of Lane Closures that affect the Transitway no later than 14 days prior to the commencement of the applicable Lane Closure.

E1.11.6 If the Schedule of Lane Closures is endorsed with "Comments" as set out in Schedule 5, in respect of any period of Lane Closure requested, the City shall notify Project Co thereof with reasons and shall indicate, in the case of an objection, an appropriate duration for such Lane Closure and in any other case a period when the unacceptable period can be re-scheduled, on the basis that each such re-scheduled period shall be as close as reasonably practicable to the requested period of Lane Closure and of equal duration or, if Project Co has indicated another period and/or duration that would be preferable to it and that is acceptable to the City, such other period and/or duration. Project Co shall thereupon amend the applicable Schedule of Lane Closures accordingly and re-submit the same to the City in accordance with the Review Procedure.

E1.11.7 The City's review of Lane Closures shall not be unreasonably withheld or delayed, having regard to the factors set out in the Review Procedure.

E1.11.8 Project Co shall not cause any Lane Closures, except:

(a) In accordance with the Schedule of Lane Closures to which no objection has been made under the Review Procedure; or

(b) In the event of an Accepted Lane Closure.

E1.11.9 Notwithstanding that there has been no objection to the Schedule of Lane Closures in accordance with the Review Procedure, the City may, upon 30 days prior written notice, require Project Co to re-schedule a period of Lane Closure if due to a change in circumstances such re-scheduling is necessary.

E1.11.10 The City may not require:

(a) That such period of Lane Closure be brought forward by more than 30 days from the scheduled date of commencement of such period; or

(b) That a period of Lane Closure be deferred by more than 30 days from the scheduled date of commencement.

E1.11.11 This clause has been deleted.

E1.11.12 Within the OMR Period, Project Co will be permitted full access to the Transitway for any Operational Maintenance Services during the hours of 02:00 – 05:00, seven days a week, except for emergency vehicles.

E1.11.13 Project Co shall provide to the City such information (including without limitation details of proposed Lane Closures and information about its traffic safety and management measures of the OMR Services) as may be required for purposes of any information service operated by or on behalf of the City from time to time.

E1.11.14 Project Co shall address Infrastructure User or general public complaints or comments received through means outlined in Schedule 24 – Communications Plan or received by the City, during the OMR Period.

E1.11.15 For planned OMR Services on the Transitway and Roadways, the following requirements shall be met:

(a) For stationary temporary closures:

(i) At least one lane of traffic shall be maintained, at all times, in accordance with the *Manual of Temporary Traffic Control on City Streets (2015)*;

(ii) Where OMR Services are required to take place, the Transitway may be reduced to one lane of traffic open for both directions for a maximum length of 150 m including the taper;

(iii) Where the affected zone requiring OMR Services is of a length greater than 150 m, two temporary work zones are to be created with a relief area of one lane in each direction of a minimum length of 100 m;

(iv) During single lane operation while construction Workers are present, flagging or temporary signals shall be provided at either end of any OMR Services taking place to direct Transit bus operations through the temporary closure. When no Workers are present, flaggers are not required to provide guidance to Transit operations. Flaggers shall be certified according to the Workplace Safety and Health Act and Regulations;

(v) Temporary closures of the Transitway down to one lane shall not be longer than three days in any one location without prior approval from the City;

(vi) Transit Peak Period closures for the Transitway and Peak Periods for the Roadways will not be permitted without prior approval from the City; and

(vii) Workers will not be permitted to be present between 06:00 and 09:00 as well as 15:30 and 18:30 without prior approval from the City.

(b) For moving temporary closures:

(i) Moving construction zones shall be understood to be operations such as, but not limited to, street sweeping, sanding, snow clearing, line painting, snow hauling, crack sealing, and diamond grinding;

(ii) A moving construction zone shall maintain a forward progression at all times and shall cause the Transitway to be down to one lane for a length no greater than 150 m during non-Transit Peak Periods;

(iii) Transit Peak Period closures for the Transitway and Peak Periods for the Roadways will not be permitted without prior approval from the City;

(iv) Workers will not be permitted to be present between 06:00 and 09:00 as well as 15:30 and 18:30 without prior approval from the City;

(v) For OMR Services with Workers present on foot, flagging shall be required at both ends of the temporary closure;

(vi) Maintenance of this type shall have full access to both lanes of the Transitway between 02:00 and 05:00, as outlined in E1.11.12; and

(vii) Notwithstanding E1.11.15(b)(v), no flagging is required on the Transitway when Project Co is carrying out any OMR Services during the No Service Periods, providing Project Co implements appropriate lane closure safety controls and protocols in accordance with Appendix W – Manual of Temporary Traffic Control on City Streets, City of Winnipeg (2015) and according to safety protocols defined by the Workplace Safety and Health Act and Regulations.

(c) Closures for OMR Services will not be permitted without prior approval from the City; and

(d) No Lane Closures will be permitted on the Transitway on an IGF Event Day from the end of Stadium Access Works to the end of the OMR Period, unless otherwise approved by the City.

E1.12 In addition to maintenance vehicles operated by Project Co during the OMR Period, access to the Transitway shall also include Public Transit vehicles, Transit supervisory and maintenance vehicles (operated by the City of Winnipeg), emergency vehicles and vehicles operated by Winnipeg Police Service, as outlined in the City of Winnipeg by-law 89/2014, as amended. All other aspects of the by-law shall also apply.

E1.13 Utility Infrastructure

E1.13.1 During the OMR Period, a Utility Company's Utility Infrastructure may need to be removed, relocated or upgraded to facilitate major maintenance, rehabilitation, or replacement of a portion of the constructed facilities. Relocation of Utility Infrastructure during the OMR Period at Project Co's request, or as a result of damage caused by Project Co, including all associated costs, shall be borne by Project Co. Relocation of Utility Infrastructure initiated by a Utility Company not triggered by something Project Co has done or is doing shall be at a Utility Company's expense.

E1.13.2 Project Co is responsible for all service charges including, but not limited to, electricity, gas, and communication delivered to any New Infrastructure during the OMR Period. This shall include, but is not limited to, services brought to the Transitway, pump stations, Transit stations, Park and Rides, Kiss and Rides, under bridge and tunnel lighting, AT path lighting, Transitway lighting, and pedestrian underpass lighting. Service charges shall include, but not be limited to; service charges, consumption charges, and service electrical charges. Project Co shall enter into a service agreement with Manitoba Hydro on behalf of the City for these service charges. For clarity, Project Co is not responsible for any energy and lighting costs for Stage 1.

E1.13.3 In the event that a line is no longer required, the Utility Company shall advise the City and Project Co and arrange for the line to be removed or abandoned and, when applicable, for the structure to be restored to the condition commensurate with that prior to the removal of the line.

E1.13.4 During the OMR Period, if new Utility Infrastructure is needed to serve the area, Project Co shall allow the installation once approved by the City of Winnipeg Underground Structures Department and Project Co. Project Co may charge the Utility Company fees equal to the City of Winnipeg cut permits, in accordance with the annual Council approved cut permit rates, to do restoration. For clarity, Project Co will be responsible for any cut repairs on the Transitway and shall ensure that the repairs are in accordance with the Technical Requirements.

E1.14 Stage 1 Infrastructure

E1.14.1 An assessment and inventory of the Stage 1 Infrastructure will be conducted prior to the commencement of the OMR Period. The City and Project Co will conduct a joint assessment and inventory of the Stage 1 Infrastructure, with the exception of the Transitway pavement which will be done by the City and will be made available to Project Co. The City shall repair any deficiencies in the Stage 1 Infrastructure identified by such assessments and perform maintenance and rehabilitation services on the Stage 1 Infrastructure, other than any OMR Services to be performed by Project Co, as are reasonably appropriate and in accordance with Good Industry Practice and the City's asset management in the ordinary course, so as not to impair the performance of the OMR Services by Project Co. These inspections will be performed on an annual basis for the duration of the OMR Period.

E1.15 OMR Mobilization and OMR Demobilization

E1.15.1 OMR Mobilization shall not occur more than 30 days in advance of Substantial Completion.

E1.15.2 OMR Demobilization shall be complete no more than 30 days after the Termination Date.

E1.15.3 Site Inspection

(a) Prior to OMR Mobilization, Project Co shall inspect the OMR Period Lands and Stage 1 Lands with the City to verify existing condition of the OMR Period Lands and Stage 1 Lands:

(i) Project Co shall prepare inspection reports and take detailed photographs of the site inspection, which shall be identified with the information as set out in B10; and

(ii) Project Co shall submit the inspection reports and photographs in accordance Schedule 5 – Review Procedure. OMR Mobilization shall not commence until the Review Procedure has concluded.

(b) After OMR Demobilization, Project Co shall inspect the OMR Period Lands and Stage 1 Lands with the City to confirm the OMR Period Lands and Stage 1 Lands have been restored to their original condition prior to OMR Mobilization.

(c) As there will be multiple occurrences of OMR Mobilization and OMR Demobilization throughout the OMR Period Lands and Stage 1 Lands during the OMR Period, it is acceptable to limit the inspection and restoration to those areas affected by the OMR Services for that particular occurrence.

E1.15.4 Secure Site Fencing

(a) Where OMR Services equipment or supplies could jeopardize the safety of the Infrastructure User or where instructed by the City, Project Co shall install a minimum 1.8 m high chain-link secure fence around any site lay-down and site areas prior to commencement of OMR Services.

(b) The secure fence shall be located and installed to ensure the safety of the Infrastructure User at all times.

(c) The fencing shall remain secure and in place until OMR Demobilization at that location.

E1.15.5 Access Roadway

(a) Project Co shall maintain any access roadway they install.

(b) The access road shall be maintained on a regular basis to provide continual unrestricted site access, to the satisfaction of the City.

(c) The access roadways shall be removed during OMR Demobilization and the area shall be restored to its original condition, unless the City identifies it for future use.

E1.15.6 Traffic Gates

(a) Project Co shall supply, install, maintain, and remove steel gates to keep the Infrastructure User out of the OMR Period Lands, which shall be installed prior to commencement of OMR Services at that location, unless directed otherwise.

(b) The gates shall remain secure and in place until OMR Demobilization at that location.

E1.15.7 Restoration of OMR Period Lands

(a) Upon OMR Demobilization, Project Co shall restore the OMR Period Lands to their original condition, unless the City identifies it for future use.

(b) Where OMR Services for a component of the Project is complete prior to the Termination Date and Project Co has demobilized from that area, Project Co shall not wait for the Termination Date to proceed with restoration efforts. However, if additional construction efforts are required to address deficiencies not rectified prior to demobilizing or identified during subsequent inspections, Project Co will be responsible to restore the OMR Period Lands and Stage 1 Lands caused by damage from the additional maintenance and rehabilitation services.

(c) Any deficiencies noted during the site inspections to confirm the restoration efforts, as outlined in E1.15.3(b), shall be rectified by Project Co.

(d) All restoration efforts shall be completed no more than 90 days after OMR Demobilization at that location.

E1.15.8 Safety

(a) Project Co shall adequately plan and undertake OMR Mobilization and OMR Demobilization to ensure the safety of the Infrastructure User is maintained at all times.

(b) Project Co shall provide temporary signage, fencing, barricades, flagpersons or security personnel as required when Mobilization and Demobilization is underway and the safety of the Infrastructure User could be at risk from interim conditions of the construction efforts.

E1.16 The following table summarizes Project Co's notification requirements for lane closures and access requirements. Project Co shall inform the City Representative and the City Transit Department (Chief Inspector, currently held by George Fatouros at 204-986-5745 or e-mail at gfatouros@winnipeg.ca) of all lane closures and access requirements on the Transitway in accordance with Table 15, which is based on the response requirements identified throughout Part E:

Table 15: Transitway Lane Closure and Access Notification

Activity	Project Co Response Requirement as identified in Part E	Minimum Notification Requirement
LANE CLOSURES ON THE TRANSITWAY		
Scheduled lane closures as identified in Project Co's Schedule of Lane Closures outlined in E1.11.4	Notwithstanding E1.11.5, N/A	12 hours
Unscheduled Lane Closure	< 48 hours	Notify immediately prior to lane closure
Unscheduled Lane Closure	Between 48 hours and 5 days	12 hours
Unscheduled Lane Closure	> 5 days	48 hours
Lane closures during the hours of 2:00 – 5:00, seven days a week as outlined in E1.11.12.	N/A	12 hours
ACCESS TO THE TRANSITWAY NOT REQUIRING A LANE CLOSURE		
Access for Inspection Requirements (E2)	N/A	12 hours
Access for Operational Maintenance Services during the hours of 2:00 – 5:00, seven days a week as outlined in E1.11.12, except for E3.4(a).	N/A	12 hours
Access for Operational Maintenance (E3), Preventative Maintenance (E4), Rehabilitative Maintenance (E5), and Performance Requirements (E6) where no Lane Closures are required	< 48 hours	Notify immediately prior to accessing Transitway
Access for Operational Maintenance (E3), Preventative Maintenance (E4), Rehabilitative Maintenance (E5), and Performance Requirements (E6) where no Lane Closures are required	> 48 hours	12 hours

E2. INSPECTION REQUIREMENTS

E2.1 Project Co shall inspect the OMR Infrastructure on a frequency as outlined below, and shall record and report all inspections to the City, in the OMR Monthly Report.

E2.1.1 Project Co shall provide sufficient resources to patrol the OMR Infrastructure to observe, react to, and report all circumstances or conditions affecting Infrastructure Users or the future repair of the OMR Infrastructure.

E2.1.2 Project Co shall investigate reports of adverse conditions from members of the public, regulatory agencies, police authorities or the City, and immediately begin to make the site in a safe manner of all hazardous conditions in accordance with E1.9.8(a)(ii).

E2.1.3 During the performance inspections, or at any other time Project Co's personnel are travelling on the OMR Infrastructure, such personnel shall observe conditions of the surfaces and appurtenances for the purpose of identifying any deficiencies and scheduling such OMR Services as required and ensuring compliance with the Technical Requirements.

E2.2 Transitway, Roadway and AT Path Inspection Requirements

E2.2.1 Inspections for the Transitway, Roadway and AT paths shall, at a minimum, be conducted at the following frequencies:

(a) Inspect the Transitway, Roadways and AT path a minimum of every two weeks for OMR Service requirements;

(b) Carry out inspections more frequently in Winter Months to deal with ice and snow pack and drifting;

(c) Inspect drainage of catch basins in tunnels weekly;

(d) Confirm the retroreflectivity of all signs visually during dark (night-time conditions) at least once every six months.

(e) Signs that are considered to be deficient with respect to E2.2.1(d), shall be replaced within 30 days of the visual inspection;

(f) Confirm the cleanliness of the retroreflectivity of signs visually during dark (night-time conditions) at least once every three months; and

(g) Signs that are considered to be deficient with respect to E2.2.1(f), shall be cleaned within two days of the visual inspection.

E2.2.2 Inspections for OMR Services for the Transitway, Roadway, and AT paths shall include, but shall not be limited to, the following:

(a) Observe pavement and pathway conditions and repair requirements;

(b) Snow clearing, snow hauling, and snow or weather issues and icing conditions on Transitway, Roadway, AT path, and bridge decks;

(c) Pavement markings;

(d) Damaged signage;

(e) Drainage problems including blocked or frozen catch basins, erosion or lack of capacity of ditches, large amounts of standing water, excess growth of plant material in ditches, culverts and drainage grates, particularly during spring thaw and runoff. Project Co shall make interim repairs in these areas when possible;

(f) Any required cleaning and litter removal along the Transitway, Roadway or AT path;

(g) Graffiti;

(h) Burned out lights along the Transitway, Roadway, or AT path;

(i) Grass cutting, weed control and landscape maintenance;

(j) Fence damage;

(k) Transitway, Roadway, or AT path sweeping requirements;

(l) Damage to structures or appurtenances; and

(m) Roadside or median barriers and other crash attenuation devices which have been damaged or moved from the original position, or any other condition that prevents, or reduces the effectiveness of the barrier from performing its intended function.

E2.3 Structure Inspections Requirements

E2.3.1 During Project Co's regularly scheduled inspections of the Transitway, Roadway, and appurtenances as specified in E2.2, Project Co shall pay special attention to the condition, functionality and safe operation of the grade separation structures, embankment slopes, earth retaining structures, and noise attenuation barriers. Project Co shall ensure that qualified personnel carry out the regularly scheduled inspections. Any deficiencies that pose an Imminent Danger to the Infrastructure Users shall be addressed immediately.

E2.3.2 In addition, Project Co's OMR Plan (B11) shall include details for regular scheduled structure inspections to measure and determine compliance with the structure performance requirements identified in E6. Appropriate OMR Services are expected to be required during the OMR Period. Project Co is expected to take appropriate action to address identified deficiencies in accordance with their approved OMR Plan to ensure the long-term durability and serviceability of all structures.

E2.3.3 Project Co shall notify the City a minimum of two weeks in advance of the scheduled inspection and testing date and time. The City may elect to have a representative on site during Project Co's scheduled inspection and testing. The City also reserves the right to complete inspection or testing concurrently with Project Co's scheduled inspection and testing or at any other time. In the event the City elects to complete inspection and testing concurrently with Project Co's scheduled inspection and testing, Project Co shall provide the required traffic accommodation and assistance and cooperation.

E2.3.4 All structures included under the OMR Infrastructure will be considered a component of the City of Winnipeg bridge structure inventory and shall be subject to an annual Level 2 Detailed Visual Inspection in accordance with *OSIM* between May 15 and September 15.

(a) Notwithstanding E2.3.4, Osborne Station will be exempt from the requirement for an annual Level 2 Detailed Visual Inspection.

E2.3.5 Structural inspections shall include, but not be limited to, to the following:

(a) Inspection and testing of the structures to measure and determine compliance to the performance requirements. The compliance inspection and testing shall be in accordance with the Ontario Structures Inspection Manual (OSIM) and the Ontario Structures Rehabilitation Manual (OSRM);

(b) Damage to structures or appurtenances;

(c) Roadside or median barriers and other crash attenuation devices which have been damaged or moved from the original position, or any other condition that prevents, or reduces the effectiveness of the barrier from performing its intended function;

(d) Condition of bridge structure components (e.g., wearing surface, traffic barriers and expansion joints);and

(e) Any additional investigations or testing requirements identified in the Level 2 Detailed Visual Inspection shall be carried out in accordance with OSIM and OSRM.

E2.3.6 Within 60 days of the completion of any inspection and/or testing, Project Co shall provide the OSIM inspection report and testing results within the OMR Monthly Report identifying any components or elements found to be non-compliant with the performance requirements in E6. Each identified deficiency will be categorized as structural, functional, or operational maintenance in accordance with the requirements of F3.2 along with the specified time period for commencement or completion of repair and/or remediation actions.

E2.3.7 Any components or elements found to be non-compliant by City Parties or City Advisors will be communicated to Project Co to be addressed in accordance with E2.3.6.

E2.4 Station, Stops, Park and Ride, and Kiss and Ride Inspection Requirements

E2.4.1 Inspections of stations, stops, Park and Ride, and Kiss and Ride facilities shall, at a minimum, occur at the following frequency:

(a) Inspect stations and stops weekly;

(b) Inspect Park and Ride and Kiss and Ride facilities every two weeks;

(c) During the Winter Months, inspect stations, stops, Park and Ride, and Kiss and Ride facilities more frequently to deal with ice and snow pack and drifting; and

(d) Confirm the retroreflectivity as outlined in E6.11.1(a)(v) and illumination of all signs visually during dark (night-time conditions) at least once every month within stations and stops.

(e) Signs that are reasonably considered to be deficient with respect to E2.4.1(d), shall be replaced within five days of the visual inspection.

E2.4.2 Inspections for the OMR Services for stations, stops, Park and Ride, and Kiss and Ride facilities shall include, but shall not be limited to, the following:

(a) Observe conditions, cleaning requirements, and repair requirements;

(b) Snow or weather issues, icing conditions on station and stop platforms;

(c) Sign conditions for each inspection including, damaged signage, flag poles, kiosks, totems, etc.;

(d) Drainage problems including blocked catch basins, downspouts, erosion or lack of capacity of ditches, ponding of water, culverts and drainage grates, particularly during spring thaw and runoff. Project Co shall make interim repairs in these areas when possible;

(e) Any required cleaning and litter removal;

(f) Damage to shelters, structures, fences, and appurtenances;

(g) Graffiti;

(h) Burned out lights within stations, stops, Park and Ride facilities, and Kiss and Ride facilities;

(i) Non-functioning, malfunctioning heaters in shelters at stations and bus stops;

(j) Grass cutting, weed control and landscape maintenance as well as excess growth of plant material and shrubs; and

(k) Snow clearing, snow hauling, and ice control.

E2.5 Pump Stations

E2.5.1 At a minimum, pump stations shall be inspected monthly.

E2.5.2 During routine observations of the pump stations, the following shall be observed for consideration of OMR Services, including, but not limited to:

(a) Mechanical, electrical, and alarm systems are tested and operating as designed;

(b) Pumps; and

(c) Back-up power source is available on stand-by should it be needed.

E2.6 Public Art

E2.6.1 At a minimum, Public Art shall be inspected monthly.

E2.6.2 During routine observations of the Public Art, the following shall be observed for consideration of OMR Services, including, but not limited to:

(a) Observe conditions, cleaning requirements, and repair requirements;

(b) Snow, weather issues, or icing conditions;

(c) Damage; and

(d) Graffiti.

E3. OPERATIONAL MAINTENANCE

E3.1 Project Co shall be required to maintain the OMR Infrastructure in a safe and effective operating condition at all times during the OMR Period.

E3.2 Project Co shall record and report all Operational Maintenance performed, including segments worked and activities performed, in the OMR Monthly Report.

E3.3 If the City agrees that noted deficiencies do not fall within the category of structural and functional, they shall be categorized as Operational Maintenance. Project Co shall complete Operational Maintenance to rectify these deficiencies within two weeks of identification.

E3.4 Operational Maintenance, completed at a minimum to the Performance Requirements found in E6, shall include, but not be limited to, the following:

(a) Snow clearing, snow hauling, and ice control;

(b) Lighting within the following locations:

(i) AT path lighting;

(ii) Park and Ride lighting;

(iii) Kiss and Ride lighting;

(iv) Station lighting;

(v) Lighting through grade separated structures like wall packs or equivalent under bridge structures and in tunnels; and,

(vi) Transitway Lighting as per C20.5.

(c) Spring clean-up by scraping, collecting, removing, and disposing of winter sand, tracked dirt and all other debris from within the OMR Infrastructure and adjacent right-of-way;

(d) Structures and earth retaining structures washing;

(e) Removing and disposing of incidental refuse and litter, including emptying waste containers, within stations and stops;

(f) Removing and disposing of incidental refuse and litter including emptying waste containers along the AT path and throughout the property limits identified in Appendix C and D of Schedule 12 – Lands and Identified Encumbrances;

(g) Street sweeping of Transitway and Roadways, Park and Ride facilities, Kiss and Ride facilities, AT path, etc.;

(h) Removing graffiti from the OMR Infrastructure;

(i) Within shelters, power wash floors;

(j) Deodorizing station shelters;

(k) Within stations and stops, cleaning and disinfecting bodily fluid spills using approved procedures;

(l) Within stations and stops, clean up and replace broken glass;

(m) Washing glass and windows at Transitway stations and stops;

(n) Washing street furniture at stations and stops during non-winter conditions;

(o) Washing of all signs listed in C17;

(p) Removing non-conforming signs from the OMR Infrastructure;

(q) Within stations and stops: hand shovelling snow; chipping ice buildup on walkways and around passenger amenities and around shelter doors; sanding or salting;

(r) Turning off heat to shelters April 30 and reinstating heat to shelters November 1, of each Agreement Year;

(s) Inspecting shelter heaters each Agreement Year between November 1 and April 30 and repair as required;

(t) Scheduling required maintenance of all drainage system components, and completing such maintenance and draining prior to freeze-up each Agreement Year;

(u) Removing minor blockages in the drainage system;

(v) Hydro vac cleaning on a spring and fall basis of catch basins in any Transitway tunnel or underpass and on an as needed basis everywhere else;

(w) Maintaining pavement markings;

(x) Cleaning up oil, mechanical or vehicular fluid spill; and

(y) Grass cutting and landscaping maintenance.

E3.5 Winter Operational Maintenance

E3.5.1 Project Co shall complete snow clearing, snow hauling, and ice control for this Project.

E3.5.2 Project Co shall prepare and submit an annual specific and updated Snow Clearing and Ice Control Plan in accordance with Schedule 5 – Review Procedure. The plan shall be acceptable to the City and in place by September 15 of each Agreement Year. The accepted Snow Clearing and Ice Control Plan shall be adhered to throughout the OMR Period.

E3.5.3 Project Co's Snow Clearing and Ice Control Plan shall include periods for which the level of equipment shall be available throughout the Winter Months and identify levels of equipment that will be available during non-Winter Months to respond to snow falls during these periods.

E3.6 Public Art

E3.6.1 Operational Maintenance shall be maintained as outlined in the Maintenance Manual provided by the artist following initial installation as set out in Schedule 23: Public Art.

E4. PREVENTATIVE MAINTENANCE

E4.1 Preventative maintenance is the care and servicing of the OMR Infrastructure by providing systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.

E4.2 Project Co shall record and report monthly, all Preventative Maintenance performed, including segments worked and activities performed, in the OMR Monthly Report.

E4.3 At a minimum, the following Preventative Maintenance requirements shall be met:

(a) Silane sealing in accordance with C7.7.8 and C23.10.7 shall be applied every four years for the duration of the OMR Period.

E4.4 Preventative Maintenance, completed at a minimum to the Performance Requirements found in E6, shall include, but not be limited to, the following:

(a) Regular sealing program for structural concrete surfaces exposed to de-icing salts;

(b) Asphalt reflective crack sealing;

(c) Mill and fill replacement of the asphalt wearing surface;

(d) Replacement of failed expansion joint seals;

(e) Patching pot holes;

(f) Partial depth repairs; and

(g) Diamond grinding.

E4.5 Preventative Maintenance shall be maintained as outlined in the Maintenance Manual provided by the artist following initial installation as set out in Schedule 23: Public Art.

E5. REHABILITATIVE MAINTENANCE

E5.1 At least one month prior to commencement of any Rehabilitative Maintenance actions, Project Co shall submit Detailed Design drawings and/or construction specifications required for the proposed Rehabilitative Maintenance to the City for information and review in accordance with Schedule 5 – Review Procedure.

E5.2 Project Co shall record and report monthly, all Rehabilitative Maintenance performed, including segments worked and activities performed, in the OMR Monthly Report.

E5.3 Rehabilitative Maintenance shall, at a minimum, be completed to the Performance Requirements found in E6.

E5.4 Any Rehabilitative Maintenance that requires the closure of a lane on the Transitway shall be done as described in E1.11.

E5.5 Notice of Rehabilitative Maintenance

E5.5.1 Notification of Transitway, Roadway, drainage, Park and Ride and Kiss and Ride facility rehabilitation shall be at least one month prior to commencement of any Rehabilitative Maintenance actions. Project Co shall provide written notification including information on Lane Closures and impacts to the Infrastructure User and shall submit Detailed Design drawings and/or construction specifications required for the proposed Rehabilitative

Maintenance to the City for information and review in accordance with Schedule 5 – Review Procedure.

E5.5.2 Notification of structure Rehabilitative Maintenance shall be at least two months in advance of any proposed grade separation structure, embankment slope, noise mitigation structure, overhead sign structure maintenance or rehabilitation actions. Project Co shall provide written notification outlining the Rehabilitative Maintenance proposed, schedule for commencement and completion, hours of Rehabilitative Maintenance and any Lane Closures or impacts to the Infrastructure User. At least six weeks prior to commencement of any rehabilitation of the structures, Project Co shall submit Detailed Design drawings and/or construction specifications for the proposed Rehabilitative Maintenance to the City for information and review in accordance with Schedule 5 – Review Procedure.

E5.5.3 Notification of AT path Rehabilitative Maintenance shall be at two weeks prior to commencement of any Rehabilitative Maintenance actions. Project Co shall provide written notification including information on the closure of any segments of the AT path and impacts to the Infrastructure User and shall submit Detailed Design drawings and/or construction specifications required for the proposed Rehabilitative Maintenance to the City for information and review in accordance with Schedule 5 – Review Procedure.

E5.5.4 Notification of station Rehabilitative Maintenance shall be at least one month prior to commencement of any Rehabilitative Maintenance actions. Project Co shall provide written notification including information on Lane Closures and impacts to the Infrastructure User and shall submit Detailed Design drawings and/or construction specifications required for the proposed Rehabilitative Maintenance to the City for information and review in accordance with Schedule 5 – Review Procedure.

E5.5.5 Notification of landscaping, spring clean-up, pavement markings Rehabilitative Maintenance shall be at least two weeks prior to commencement of any Rehabilitative Maintenance actions. Project Co shall provide written notification including information on Lane Closures and impacts to the Infrastructure User and construction specifications required for the proposed Rehabilitative Maintenance to the City for information and review in accordance with Schedule 5 – Review Procedure.

E5.5.6 Rehabilitative Maintenance shall be maintained as outlined in the Maintenance Manual provided by the artist following initial installation as set out in Schedule 23: Public Art.

E6. PERFORMANCE REQUIREMENTS

E6.1 General

E6.1.1 Performance requirements not defined with a testing and inspection frequency shall be tested at a minimum of once per year. Within 45 days of the test, testing results shall be submitted to the City for review in accordance with Schedule 5 – Review Procedure. Project Co's requirement to monitor performance against the requirements in the Technical Requirements shall be reflected in the Performance Monitoring Report in accordance with Schedule 14 – Payment Mechanism.

E6.1.2 Failure to conform to the performance requirements specified in the Technical Requirements will result in deductions from Project Co's Monthly Payments, based on the classification of each such Non-Conformance as an Availability Failure, Service Failure or Quality Failure, in accordance with Schedule 14 – Payment Mechanism.

E6.1.3 When a specific deficiency is identified and it is not an Imminent Danger, and times are not defined in the following sections, Project Co shall correct the OMR Infrastructure such that it complies with the performance requirements in accordance with the following:

(a) If Project Co is aware, or should have been aware, of the deficiency prior to September 1 in any calendar year, Project Co shall complete the repairs prior to October 31 of the same calendar year; or

(b) If Project Co is aware or should have been aware of the deficiency after September 1 in any calendar year, Project Co shall complete the repairs prior to August 31 of the following calendar year.

E6.2 Transitway and Roadway

E6.2.1 General

(a) Project Co shall maintain the entire pavement structure, appurtenances, and all associated OMR Infrastructure in accordance with the performance requirements, until the end of the OMR Period. All areas of pavement including shoulders shall be maintained to similar conditions as the driving lanes.

(b) Project Co shall be proactive in OMR Services of the OMR Infrastructure and shall test conformance with the performance requirements on a minimum of an annual basis or as stipulated by the Technical Requirements. Project Co shall schedule testing prior to the later of May 20 of each Agreement Year or four weeks following the City of Winnipeg Public Works Department declaring the ground free of frost and permitting construction to commence, but no later than June 15 of each year so that any required repairs can reasonably be completed in the same calendar year.

(c) For each of the Technical Requirements, the City may also conduct measurements for compliance and advise Project Co of any deficiencies.

(d) Project Co shall schedule testing to allow time for required repairs within the Agreement Year.

E6.2.2 Pavement Geometric Requirements

(a) Project Co shall maintain all Transitway, Roadway, Park and Ride, and Kiss and Ride sections to the designed lines and grades. Tolerances listed below shall be met where tolerances refer to the finished pavement surface.

(b) The Transitway and Roadway superelevation and cross-slope rates shall be constructed to be within ±0.2% of the design rates immediately after construction and within ±1.0% of the design rates during the OMR Period.

(c) The pavement surface width shall be constructed and maintained to the width defined by the standard cross-section for the specific area of Roadway and Transitway. The mainline pavement surface width shall not be less than the design width immediately after construction and shall not be less than the design width after any pavement rehabilitation undertaken during the OMR Period.

(d) Project Co shall measure the Roadway and Transitway superelevation and cross-slope immediately prior to Substantial Completion of the Project and after each major surface rehabilitation and whenever the surface appears to not meet the superelevation and cross-slope requirements. Notwithstanding the foregoing, the City may elect to test or measure the Roadway or Transitway independently if there are concerns regarding the serviceability of the Roadway or Transitway.

(e) If the results of the measurements indicate that the OMR Infrastructure does not comply with the specified criteria, the OMR Infrastructure will be determined to be deficient and Project Co shall schedule remedial OMR Services within the specified time period indicated in E6.2.1.

(f) Snow clearing and hauling shall be consistent with Manitoba Hydro's snow clearing policies within the Manitoba Hydro Right-of-Way and underneath transmission lines as a means of clearing the New Infrastructure including, but not limited to:

(i) Park and Ride and Kiss and Ride facilities; and

(ii) Parking lots.

E6.2.3 Pavement Performance Requirements

(a) Project Co shall maintain all pavement sections including all asphalt and concrete works, on a regular basis in order to ensure that they remain in a structurally sound and safe condition and continue to provide the service for which they were intended.

(b) Project Co shall inspect OMR Infrastructure on a continual basis as part of the schedule of inspection, and shall identify deficiencies.

(c) All pavements, station platforms, concrete works, and other surface works shall be maintained to function as designed. All pavement works shall be maintained to ensure the following ponding conditions are not exceeded:

(i) Where pedestrians will be traveling, such as AT paths and station platforms, ponding shall not be greater than 10 mm in depth and 3 m^2 in area; and

(ii) Where vehicles will be traveling such as Roadway, Transitway, shoulder, bus staging areas, Park and Ride facilities or other pavement within the Project, ponding shall not be greater than 10 mm in depth and 10 m^2 in area.

(d) Project Co shall undertake the required pavement repairs to maintain the pavement surface in a safe condition with the following requirements:

(i) If a pavement deficiency is a hazard to a bus or vehicular traffic, Project Co shall begin repairs immediately regardless of size;

(ii) Localized deficiencies affecting functionality shall be repaired within 36 hours following the time when Project Co became aware, or should have become aware, of the deficiency;

(iii) Localized deficiencies which are not affecting functionality shall be repaired within 21 days following the time when Project Co became aware, or should have become aware, of the deficiency; and

(iv) All other pavement repairs shall be undertaken within 30 days of the time Project Co became aware, or should have become aware, of the deficiency. Maintenance repair requirements apply year-round and may be required during poor weather conditions.

(e) The following are classified as a localized deficiency:

(i) Broken or damaged pavement:

- Affecting functionality shall be defined as a deficiency within any travel lane greater than 0.1 m^2; and
- Not affecting functionality shall be defined as a deficiency not located within the travel lanes and/or do not exceed 0.1 m^2 in size.

(ii) Spalling 25 mm in depth or other distress at crack locations and joints;

(iii) Scaling of a concrete surface shall be limited to no more than 10% of surface area in any 5 lineal metre section;

(iv) Cracking of concrete shall be limited to a maximum crack width of 3 mm, occurring at a maximum frequency of one crack every 2 m; and

(v) Curb height shall be maintained and repaired where missing or damaged to meet the requirements of the Technical Requirements and in no case shall be less than 95% of the design height. Damaged curb from winter maintenance shall be repaired by June 15 of each calendar year.

(f) Asphalt overlays and mill and fills as per the Guideline from Mill and Fill Pavement Rehabilitation Method will be permitted on Roadways, however, an asphalt overlay of the Transitway will not be permitted.

(g) Concrete pavements shall receive repairs in concrete and asphalt pavements shall receive repairs in asphalt. In instances where temporary repairs are required prior to the permanent repair taking place in accordance with E6.2.3(d), E6.2.3(g) shall not apply. Such temporary repairs may not be in place for more than 30 days as set out in E6.2.3(d)(iv). However, in Winter Months when permanent repairs may not be possible due to freezing conditions, temporary measures may stay in-place until the ground is free of frost.

(h) Transitway shall be tested within two years of Substantial Completion and then once every five years to determine the International Roughness Index (IRI). An IRI equal to or less than 1.25 m/km shall be reached for the initial measurements after Substantial Completion and measurements equal to or less than 2.10 m/km shall be maintained or IRI measurements taken until year 20. An IRI of 2.4 m/km shall be maintained on IRI measurements taken after year 20 and until handback. Guidelines for obtaining the IRI are as follows:

(i) Project Co shall obtain the IRI measurement by use of an inertial profiler (IP) and shall provide calibration documentation of the equipment by an accredited third party. Furthermore, the IP shall have accompanying documentation that identifies its conformance with ASTM E950; and

(ii) The output profilogram shall be exportable to an unfiltered electronic Engineering Research Division (ERD) file format. The ERD filename shall follow the YYYYMMDD_N_D_L_B_E.ERD standardized format in accordance with the table below:

Table 14: Standardized Naming Convention for ERD Files

Abbreviation	Definition
YYYY	Four digit year
MM	Month (including leading zero)
DD	Day of the month (including leading zero)
N	Street name
D	Direction (NB, SB, EB, WB)
L	Lane number (1 for driving lane, increasing by one for each lane to the left)
B	Beginning station
E	End station

(iii) For each profile segment to be reported, Project Co shall submit the following:

- A printout of the Profile Summary Sheet for the street segment following the format set out in *Appendix Z – Inertial Profiler Profile Summary Sheet*;
- A printout containing the IP's setting during profiling operation for each lane;
- A printout of the interval report including: (i) left and right IRI values in mm/m, (ii) average IRI in mm/m, and (iii) Bump and Dip summary in millimeters for each lane;
- A printout of the profile along the left and right wheel path for each lane; and
- An electronic file in ERD format representing the raw data for each profile run submitted to the City.

(iv) All testing shall be continuous and be run in the direction of the traffic. Stationing shall be provided by Project Co for all testing.

(v) The profiler shall be operated at optimum speed as defined by the manufacturer.

(vi) All testing shall be reported in 100 m segments complete with a summary of all dip and bump measurements and locations.

(vii) Project Co shall run the profile in both wheel paths of each individual lane and average the resulting IRI results to determine acceptance. The profiles shall be run 0.9 m from each lane line. A guide shall be used to ensure proper alignment of the profile. The City shall have a representative present during all testing periods.

(viii) The finished surface smoothness requirements shall not include any localized bumps exceeding 10 mm in 7.5 m where the areas have reached the maximum removal depth. These areas shall be submitted in accordance with Schedule 5 – Review Procedure.

(ix) Project Co shall provide smoothness measurements, a profilogram, and a copy of the raw data in an unfiltered ERD file format for all testing; and

(x) If the results of the tests or measurements indicate that the OMR Infrastructure no longer complies with the specified criteria, the OMR Infrastructure will be determined to be in Non-Conformance and Project Co shall undertake the necessary OMR Services and provide proof within a month following the correction to address the Non-Conformance. All retesting for IRI corrections shall be done in accordance with Section E6.2.3(h).

(xi) All IRI testing shall take place in accordance with E1.11.12.

(xii) Project Co will be permitted to exclude roughness measurements directly adjacent to fixed grade elements such as expansion joints, approach slabs, grade beams, manholes, and catch basins.

(i) Rutting Performance Requirements shall be tested on all asphalt Roadway sections on the New Infrastructure by Project Co within two years of Substantial Completion and then twice every five years with at least two years between each testing, with the following requirements to be taken into account:

(i) The Transitway and Roadways shall be maintained with rut depths of less than 14 mm at all times based on 500 m average values. For 100 m sections the rut depths shall be maintained to be less than 19 mm and for any isolated section, less than 25 m in length, the rut depths shall be maintained to less than 29 mm;

(ii) Measurements shall be made using a laser based Class 1 inertial profiling device as defined by ASTM E950, or better and equipped with a minimum of 10 lasers. Rut depth measurements shall be collected for each lane on a continuous basis and reported at 50 m intervals. Rut depth measurements made with an inertial profiling device shall be averaged for each 100 m lane segment of the Transitway and Roadway for each wheel path of each lane. The rut depths shall be collected to an accuracy of +/- 0.5 mm and reported to +/- 1 mm for each 100 m lane segment;

(iii) Project Co shall conduct an on-site verification prior to the start of the measuring for compliance. The wheel path rut depth measurement equipment verification will be based on direct comparison with manually measured transverse profiles at verification sites established by the City for the evaluation of inertial profiling devices on local area Transitway and Roadway(s). Project Co is required to run the inertial profiling device over the specified site(s) three times to measure the accuracy and repeatability of the inertial profiling device. The average rut depth over the 500 m site(s) derived through the automated data collection shall be within +/- 2 mm of the average rut depth derived through manual survey. The values derived from the automated data collection will be considered repeatable if the values from each run are within +/- 1 standard deviation of the mean for the three runs;

(iv) The limiting rut depth values will apply to the average value determined for each consecutive 500 m section for each lane. Additionally, for each lane, each individual 100 m section rut depth value shall be <19 mm and all localized areas shall be maintained to have rut depth measurements of <29 mm. Localized areas shall be determined for individual wheel path locations, all other rut measurements will be based on the average of both wheel path locations, for each lane. All average rut values shall be rounded down to the nearest mm and reported as an integer value; and

(v) If the results of the tests or measurements indicate that the OMR Infrastructure no longer complies with the specified criteria, the OMR Infrastructure will be determined to be in Non-Conformance and Project Co shall undertake the necessary OMR Services to address the Non-conformance.

(j) To control the Transitway pavement performance at fixed grade elements and where there is a difference in material type (e.g., concrete and asphalt), the maximum vertical difference at the joint shall be 6 mm.

E6.2.4 Winter Maintenance Performance Requirements

(a) Project Co shall undertake winter maintenance on the OMR Infrastructure in accordance with the Policy on Snow Clearing and Ice Control, City of Winnipeg during the OMR Period.

(b) The Transitway, Roadways, and AT paths within the OMR Infrastructure shall be classified as a Priority 1 Street for snow clearing and ice control when referencing the policy mentioned above, including but not limited to, clause A-1, B-1, C-1 for AT Path, D-1, and D-2a of the Policy on Snow Clearing and Ice Control, City of Winnipeg.

(c) Park and Ride and Kiss and Ride facilities within the OMR Infrastructure shall follow the Priority 2 streets for snow clearing and ice control when referencing the policy mentioned above, even though these are parking lots and not streets. The clauses coming into effect include, but are not limited to, A-2 and B-1 of the Policy on Snow Clearing and Ice Control, City of Winnipeg, and E6.2.4(h) of the Technical Requirements.

(d) Specifications for plowing and sanding trucks shall, as a minimum, be in accordance with applicable law, including without limitation The Traffic Safety Act (Manitoba) and any regulations thereunder and any replacement or successor legislation, and applicable City standards.

(e) Sand and salt materials shall be stored in a manner identified in the EMS (B5). The TAC Synthesis of Best Practices – Road Salt Management shall be used as a guideline. Project Co shall adjust the materials storage and handling practices as necessary to address changes or developments in the environmental concerns for any of the materials used.

(f) Activities shall comply with the accepted Snow Clearing and Ice Control Plan and the City of Winnipeg Policy on Snow Clearing and Ice Control. Bare Pavement shall be achieved on all Roadways, Transitways, stations, Park and Rides, Kiss and Rides, and AT paths. Further to the policy noted above, Project Co shall conduct all winter maintenance activities with the objective of achieving Bare Pavement conditions as quickly as possible and in all cases within the required time period of 24 hours, except for the Transitway where it shall be 12 hours. Where parked cars are present, Project Co shall make one additional attempt within 24 hours between 02:00 and 05:00 to clear the areas where parked cars were previously present.

(g) Bare Pavement as defined in A2, should be achievable by Project Co under normal conditions; however, the City hereby reserves to itself the sole and absolute discretion to judge exceptional conditions in which Project Co fails to achieve that standard sufficient in circumstances where, for example, minor snowfalls occur not necessitating plowing followed by extreme cold weather for an extended time period which results in formation of compacted snow/ice on the pavement surface rendering the Bare Pavement standard, through no fault or neglect on the part of Project Co, extremely difficult to achieve.

(h) Snow clearing and hauling shall be consistent with Manitoba Hydro's snow clearing policies within the Manitoba Hydro Right-of-Way and underneath transmission lines as a means of clearing the New Infrastructure including, but not limited to:

(i) Park and Ride and Kiss and Ride facilities; and

(ii) Parking lots.

(i) Snow shall be cleared from the Transitway by pushing or gradering so as to limit the height of a windrow adjacent to the Transitway within the Manitoba Hydro Right-of-Way. Snow shall be removed from the Transitway by hauling, in accordance with Manitoba Hydro guidelines. This shall apply for windrows and snow banks over the height of 3.0 m above the driving surface of the Transitway or Roadway. In areas where the Transitway is bordered by CN and the AT path, hauling may be the required method of snow clearing.

(j) Notwithstanding E6.2.4(f), snow build-up or drifting snow, due to falling snow or snow blowing and accumulating onto the Transitway, shall be cleared by Project Co. In areas where this accumulation of snow occurs on the Transitway and bridge structures, in locations including, but not be limited to; adjacent to bridge barrier structures, underpass barriers, tunnel barriers, wing walls, retaining walls, and all other traffic barriers, Project Co shall conduct the removal with the objective of achieving Bare Pavement conditions as quickly as possible and in all cases within the required time period of 36 hours. The removal of snow shall take place when snow build-up and drifting snow in the locations mentioned above exceeds any of the following criteria:

(i) The width of the shy distance (1.5 m on structures and 1.0 m along the Transitway where barriers exist); or

(ii) The height adjacent to a barrier greater than 500 mm.

(k) Further to E6.2.4(j), should snow accumulation or drifting take place on the Transitway, the removal of snow shall commence within six hours when snow build-up and/or drifting snow exceeds 150 mm in depth anywhere from outside edge to outside edge.

(l) Similar to E6.2.4(k) should snow accumulation or drifting take place on the AT path, the removal of snow shall commence within 36 hours when snow build-up and/or drifting snow exceeds 150 mm in depth.

(m) Snow clearing of the AT path may be reduced to a width of 3.5 m as opposed to the full pathway width of 4.5 m due to reduced use in winter conditions.

E6.3 Road Side Safety Devices

(a) Road side safety devices shall be maintained to function as designed and to have a neat and tidy appearance at all times. In situations when barriers or road side safety devices are missing or damaged such that they do not function as intended, Project Co shall undertake repairs or temporarily protect the area immediately.

(i) Road side safety devices damaged by collision, snow clearing, or otherwise shall be repaired or replaced within 24 hours following the time when Project Co became aware, or should have become aware, of the deficiency, to assure the continued protection of the Infrastructure User. When immediate permanent repair is not possible, temporary repairs shall be implemented immediately.

(b) All other non-compliant sections of barrier or road side safety devices shall be repaired or replaced within 60 days following the time when Project Co became aware, or should have become aware, of the deficiency. This may include, but is not limited to, the following:

(i) Road side safety devices shall be visible at all times and reflective markers shall be clean and function as designed;

(ii) Road side safety devices shall be maintained in proper alignment, as designed, at all times. Permissible tolerances for plumb and horizontal grades shall be 20 mm from design grades. Permissible tolerances for vertical grades shall be 40 mm from design grade;

(iii) Road side safety devices that are dented, bent, twisted, or otherwise misaligned;

(iv) Posts which are structurally unsound, loose, out of plumb, or otherwise failing to provide the required functionality, shall be replaced;

(v) All components shall be securely fastened with the designed fasteners at all times; and

(vi) Concrete barrier that has concrete pieces missing or structural weakening shall be replaced or repaired within 60 days following the time when Project Co became aware, or should have become aware, of the deficiency, or by September 30, whichever is sooner, if the time of determination falls between April 1 and August 31. If the time of determination falls between September 1 and March 30, replacement or repair shall take place by the later of May 31 or four weeks following the City of Winnipeg Public Works Department declaring the ground free of frost and permitting construction to commence, but no later than June 15 of each year.

(c) In instances where temporary repairs are required, such temporary repairs may not be in place for more than five days. In Winter Months when permanent repairs may not be possible due to freezing conditions, temporary measures may stay in-place until the ground is free of frost.

E6.4 Grass Cutting and Landscape Maintenance

E6.4.1 The requirements for E6.4 are limited to the property limits identified in Appendix C of Schedule 12 – Lands and Identified Encumbrances.

(a) Project Co shall maintain the vegetation in all areas of the OMR Period Lands and Stage 1 Lands including ditches alongside the Transitway, within CN Right-of-Way, Manitoba Hydro Right-of-Way, and adjacent public reserves. Project Co shall remove and dispose of any dead vegetation and re-seed grass, if necessary, to retain the overall landscaping of the OMR Period Lands and Stage 1 Lands. Project Co shall be responsible for replacing dead trees and shrubs. Shrubs shall also be pruned and trimmed at least once per Agreement Year. Tree branches affecting movement or visibility of users of the AT paths, sidewalks, Transitway, or Roadways shall be pruned in accordance with ANSI A300 (Part1)-2001 Pruning standards entitled, "Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (Pruning)" (revisions and re-designation of ANSI A300-1995) (includes supplements) or most recent versions as available and in accordance with "Best Management Practices: Tree Pruning" (2002), which is a companion publication to the ANSI A300, or more recent version as available. All dead branches shall be removed. Pruning shall be performed by an arborist with a valid Manitoba Arborist License.

(b) Grass within the OMR Period Lands and Stage 1 Lands, including ditches alongside the Transitway and adjacent public reserves, shall not exceed 100 mm in height at any time or at a minimum be mowed monthly, except for approved natural areas designed as low mow or no mow areas. Areas requiring grass cutting within the Manitoba Hydro Right-of-Way as part of the Operational Maintenance, like ditches for example, will require a licence from Manitoba Hydro, which will be obtained by the City for the OMR Period.

(c) Project Co is liable for any damage caused to areas outside the property limits identified in Appendix C of Schedule 12 – Lands and Identified Encumbrances or public reserves occasioned by its use of chemicals for weed control and shall promptly handle any damage claims in this regard. Project Co shall also pay any fines/penalties assessed by the governing authority for failure to promptly comply with applicable requirements.

(d) Drainage system elements shall be maintained to assure full hydraulic and structural capacity, including monthly mowing of open ditch systems.

(e) Weed control shall be carried out, by Project Co, as required to control noxious weeds including all noxious weeds as designated within the City of Winnipeg by-laws.

(f) Project Co shall, as a minimum, comply with the operating standards and practices of the City of Winnipeg and shall have a service approval agreement from Manitoba Conservation and Water Stewardship, or its successor. All personnel applying chemicals shall have a valid applicators' license issued by Manitoba Conservation and Water Stewardship, or its successor.

(g) Special use approvals issued by Manitoba Conservation and Water Stewardship, or its successor, will be required in instances where chemicals are to be sprayed within 30 m of an open body of water. In such instances, Project Co shall advertise the proposed OMR Services in newspapers local to the area, 30 days prior to the scheduled starting date of the OMR Services.

(h) Project Co shall provide the City with a copy of the newspapers for E6.4.1(g), containing the advertisement. All Infrastructure User concerns shall be referred, by Project Co, to Manitoba Conservation and Water Stewardship, or its successor, who will identify any OMR Services conditions in the approval. Project Co shall be responsible for obtaining the special use approval and shall comply with the conditions specified therein.

(i) Project Co is liable for any damage caused to areas outside the OMR Period Lands and Stage 1 Lands or pubic reserves occasioned by its use of chemicals for weed control and shall promptly handle any damage claims in this regard. Project Co shall also pay any fines/penalties assessed by the governing authority for failure to promptly comply with applicable requirements.

(j) Project Co shall select and supply the appropriate chemical for vegetation control. Only chemicals approved by the City or the Federal Government for general

industrial spraying shall be used. Project Co shall supply any signs required to identify treated areas in public use areas.

(k) Project Co's use of chemicals, application rates and methods shall comply with the policies, rules and regulations of Manitoba Conservation and Water Stewardship, or its successor. Project Co shall maintain accurate records of all applications including the type and amounts of chemicals used and the locations treated. If requested, Project Co shall supply this information to the City along with copies of the bills of lading and the manufacturer's recommended application rates for the chemicals used. Project Co shall dispose of empty chemical containers only at approved disposal sites and provide records of safe disposal.

(l) Manitoba Conservation and Water Stewardship, or its successor, and the City of Winnipeg will also inspect for noxious weeds and any order or direction given to Project Co regarding deficiencies in compliance shall be dealt with immediately.

(m) Should Project Co fail to observe the need for grass cutting or landscaping maintenance within two weeks, Project Co will be considered non-compliant and the specified Payment Adjustments will be applied.

(n) Maintenance of applicable Parks and Open Space soft and hard landscaping assets will be completed in accordance with the Public Works Department Parks and Open Space Division Management Information Manual, Volume 1: Maintenance Guidelines.

(o) Deficiencies to fences shall be repaired within 96 hours following the time when Project Co became aware, or should have become aware, of the deficiency.

E6.5 Seasonal Clean-up

E6.5.1 Project Co shall conduct a spring, summer, and fall clean-up of the OMR Infrastructure annually, including parks and open space amenities, Transitway, Roadways, and AT paths to a standard equal to or better than that undertaken by the Parks and Open Space Division of the City's Public Works Department for boulevards and median and Street Maintenance for Transitway or Roadways. Project Co shall:

(a) Conduct a spring, summer, and fall litter clean up. No litter shall be visible within the OMR Period Lands and Stage 1 Lands identified in Appendix C and D of Schedule 12 – Lands and Identified Encumbrances;

(b) Scrape, collect, remove and dispose of sand, salt, dead vegetation, leaves, leafmold and debris that accumulated during the winter; and

(c) Wash all structures, retaining walls, tunnels, shelters, stations/stops, station/stop amenities, signage throughout the OMR Infrastructure, with the exception of Osborne Station of the Stage 1 Infrastructure. Washing requirements for Osborne Station shall be in accordance with E6.7.3(n).

E6.5.2 Project Co will be considered to be non-compliant with this section and the specified Service Failure Adjustments shall be applied if any of the following occur:

(a) An annual spring clean-up campaign has not been conducted, or has been conducted but has not removed all visible litter from the OMR Infrastructure, by June 1 of each Agreement Year; and

(b) The specified summer and fall clean-up operations have not been completed by August 15 and October 15 respectively, in each Agreement Year.

E6.6 Litter Clean Up

E6.6.1 Project Co shall maintain the OMR Period Lands and Stage 1 Lands within the limits identified in Appendix C and D of Schedule 12 – Lands and Identified Encumbrances including ditches alongside the Transitway and adjacent public reserves to be reasonably free of litter. The OMR Infrastructure shall be free of any and all litter that may cause damage to vehicles, or otherwise result in a safety hazard for Infrastructure Users. Project Co shall:

(a) Following the annual spring clean-up, no litter shall be visible within the property limits identified in Appendix C and D of Schedule 12 – Lands and Identified Encumbrances;

(b) Conduct litter clean up, to the same standard as the spring clean-up, on or about July 30, and September 30 each Agreement Year during the OMR Period. In addition, Project Co shall clean up any litter that covers more than 0.025 cubic metres (one cubic foot) in size or greater within the OMR Period Lands and Stage 1 Lands within one week of observing the litter;

(c) Remove litter immediately on the Roadways or Transitway that has the potential to affect traffic and dispose of;

(d) Within stations and stops, remove and dispose of incidental refuse and litter including emptying waste and recycling containers shall be completed on a weekly basis, or more frequently due to litter accumulation at specific waste and recycling containers;

(e) Remove, dispose, and recycle incidental refuse, litter and recycling including emptying waste and recycling containers along the AT path and throughout the OMR Infrastructure on a weekly basis;

(f) Remove all waste or other litter generated by Project Co's operation;

(g) Conduct monthly street sweeping of Roadways, Transitway, Park and Ride facilities, Kiss and Ride facilities, AT path, etc. from May 15 to October 1; and

(h) Remove graffiti from any location within 96 hours. Graffiti that is offensive shall be removed within 24 hours. Graffiti that cannot be effectively removed shall be covered with appropriate materials that match the colour of the receiving surface.

E6.6.2 Notwithstanding the above requirements for litter clean-up, Project Co shall work with and coordinate with policing authorities and Winnipeg Transit and their insurers to facilitate clean-up of debris resulting from accidents within the OMR Infrastructure.

E6.6.3 Project Co will be considered to be non-compliant with this section and the specified Service Failure Adjustments shall be applied if any of the following occur:

(a) The specified monthly street sweeping is not completed;

(b) Litter that poses a hazard has not been removed within the specified time period;

(c) The City or Project Co identifies that the OMR Infrastructure is littered and unsightly and such litter is not removed within the specified time frame;

(d) Graffiti is not removed or appropriately covered within the specified time frames;

(e) Waste is not removed within one week on the AT path or daily from stations and stops; and

(f) Waste generated by Project Co has not been removed within one week of the completion of OMR Services associated with the waste, or if such waste is creating an unsightly or hazardous condition.

E6.7 Stations and Stops

E6.7.1 Project Co shall maintain the Transitway stations and stops to operate as designed. All stations and stops, including but not limited to, structures, shelters, canopies, benches, bike lockers, information kiosks, flag poles, totems, signage, heaters, fences, etc. and all other appurtenances and components are to be maintained to ensure they are fully operational and no damage exists within the stations or stops. Any item that is found to not be operating as designed shall be addressed within 30 days.

E6.7.2 No rust, signs of staining, streaking, leaking or fading shall be present on any appurtenances within the station.

E6.7.3 Project Co shall maintain the Transitway stations and stops in a clean and orderly manner. Project Co shall:

(a) Power wash shelter floors during non-Winter Months, on a weekly basis;

(b) Deodorize shelters, on a daily basis;

(c) Immediately clean and disinfect bodily fluid spills using approved procedures, on an as needed basis;

(d) Wash glass and windows, including the bottom 3 m of the interior of Osborne Station of the Stage 1 Infrastructure, on a weekly basis;

(e) Immediately clean up and replace broken glass and pick up sharp items and needles on an as needed basis;

(f) Pick up litter and empty waste and recycling containers on a weekly basis, or more frequently due to litter accumulation at specific waste and recycling containers;

(g) Wash street furniture during non-Winter Months on a weekly basis;

(h) Wash all station and stop amenities (such as furniture, information kiosks, and signs) during non-Winter Months, on a weekly basis;

(i) Hand shovel snow, chip ice buildup, and sand/salt walkways and areas around information kiosks and shelter doors at stations and stops during Winter Months, on a daily basis. This shall also include the ramps and plaza at Osborne Station of the Stage 1 Infrastructure;

(j) Turn on all heaters in shelters at stations and stops every November 1, turn heaters off every April 30 with weekly inspections of heaters during Winter Months to ensure operation between these dates;

(k) Replace burned out lighting within a week of noticing or should have noticed a burned out light bulb within a Station;

(l) Wash shelter and station canopy ceilings and rooftops, excluding Osborne Station of the Stage 1 Infrastructure, on a monthly basis;

(m) Inspect and top up poison and pest control (for pigeons) products on a monthly basis; and,

(n) Clean the entire Osborne Station of the Stage 1 Infrastructure, inside and out, bi-annually. This excludes any cleaning efforts for the exterior of the polycarbonate roof.

E6.8 Drainage Systems

E6.8.1 Drainage systems shall be maintained to function as designed and to assure that environmental requirements are met at all times.

E6.8.2 Project Co shall undertake drainage system OMR Services within the OMR Period Lands and Stage 1 Lands, to ensure that the Roadway and Transitway surfaces, ditches and all other elements of the OMR Infrastructure are safe and effectively drained. This will not include drainage components carrying runoff through the OMR Period Lands that were not part of the New Infrastructure.

E6.8.3 The requirements of this section apply to any aspect of the OMR Infrastructure that serves a drainage function, including, but not limited to:

(a) Drainage structures;

(b) Stormwater management facilities;

(c) Curb and gutter (drainage function);

(d) Manholes, inlet and outlet structures, catch basins, flumes, rip rap;

(e) Storm sewers constructed by Project Co; and

(f) Ditches.

E6.8.4 Project Co shall ensure that environmental requirements required by legislation or design are met at all times and shall maintain all aspects of the drainage facilities to prevent the discharge of silt or sediments into water courses.

E6.8.5 Embankment slopes and any land within the OMR Period Lands and Stage 1 Lands including ditches alongside the Transitway and adjacent public reserves impacted by the drainage system shall be protected from erosion, including wind erosion. Project Co shall be responsible for any damage to the OMR Infrastructure, public reserves or any lands adjacent to the OMR Period Lands and Stage 1 Lands or public reserves caused by a deficiency in the Design and Construction or OMR Services of the drainage system for the Project.

E6.8.6 Project Co shall maintain the drainage system with the following requirements:

(a) Drainage system elements shall be maintained to assure full hydraulic and structural capacity, including monthly mowing of open ditch systems;

(b) Project Co shall manage the drainage system and shall immediately commence repairs of deficiencies if they could potentially cause erosion, sedimentation or flooding, or within one Agreement Year for all other repairs;

(c) Project Co shall remove minor blockages in the drainage system on a regular basis and schedule required OMR Services of all drainage system components, and completing such OMR Services and draining prior to freeze-up each Agreement Year;

(d) Project Co shall plan for and complete repairs to the drainage system on an annual basis. Drainage deficiencies identified by Project Co's inspection shall be corrected within two months excepting if such repairs are necessary to prevent the potential for ponding of water on the Roadway or Transitway surface, AT path, ditches and swales or if potential for erosion or sedimentation exists, in which case repairs shall begin within three days;

(e) Project Co shall hydro vac clean, on a spring and fall basis, catch basins in any Transitway tunnel or underpass and on an as needed basis everywhere else;

(f) Project Co shall clean the ditches and drains of snow and ice in spring prior to spring runoff; and

(g) Project Co shall complete flushing and televising of the land drainage sewers installed within this Project every five years.

E6.8.7 Project Co shall inspect, test, operate and maintain on a regular schedule, components of the pump stations so they will operate as designed when required and are maintained to the standards identified by the manufacturer(s).

E6.8.8 Project Co shall clean out the wet well sumps after an accumulation of 0.6 m of material has accumulated.

E6.9 Sidewalks/AT Paths

E6.9.1 AT paths and sidewalks shall be maintained to function as designed. Project Co shall undertake the necessary OMR Services to ensure that any sidewalk/AT path within the OMR Infrastructure is maintained in a condition that is safe for pedestrian traffic. The following shall apply:

(a) Vertical displacement at joints or cracks within the sidewalk or pathway that exceed 5 mm shall be repaired or replaced to remove the differential elevation and remove any tripping hazard;

(b) Horizontal displacement at joints or cracks within the sidewalk or pathway that exceed 15 mm shall be repaired or replaced to remove the differential elevation and remove any tripping hazard;

(c) Concrete or asphalt that is cracked in multiple locations within the same general area of a sidewalk or otherwise results in a discontinuity that may pose a tripping hazard or be a safety concern shall be removed and replaced;

(d) Concrete surfaces that exhibit scaling over more than 15% of the surface area in any 1 m² section and results in a rough surface texture shall be removed and replaced; and

(e) Crack widths in excess of 5 mm require repairs or replacement of the sidewalk section(s) affected.

E6.9.2 Project Co shall complete repairs to restore the functionality of the sidewalk and AT paths to the level for which it was originally designed. Repairs shall be completed within 30 days of the time when Project Co knew of, or should have known of, the deficiency.

E6.9.3 In instances where temporary repairs are required, such temporary repairs may not be in place for more than five days. In Winter Months when permanent repairs may not be possible due to freezing conditions, temporary measures may stay in-place until the ground is free of frost and shall be addressed by the later of May 31 or four weeks following the City of Winnipeg Public Works Department declaring the ground free of frost and permitting construction to commence, but no later than June 15 of each year.

E6.10 Embankment Slopes

E6.10.1 Embankment slopes shall be maintained as a uniform, smooth surface or straight line from the edge of pavement to edge of slope. Over the OMR Period, the straight line slope may vary from the design slope angle by no more than 5%, unless it is critical for the cross-section than it shall not vary by more than 1%.

E6.10.2 Depressions or abrupt elevation changes greater than 0.05m, for a distance of 2.0 m down the slope shall be repaired by Project Co. Abrupt changes in slope angle that form a depression greater than 0.1 m from the design straight line or slumping in slopes shall be repaired by Project Co.

E6.10.3 Project Co shall complete repairs to restore the functionality of the slopes to the level for which it was originally designed. Areas that require repair shall have an engineering plan provided by Project Co within 90 days and shall repair the embankment slope within 100 days, of the time when Project Co knew of, or should have known of, the deficiency. Should the embankment slope be of a safety concern, Project Co shall provide a temporary repair solution within seven days. In Winter Months when permanent repair may not be possible due to freezing conditions, temporary measures may stay in-place until the ground is free of frost and shall be addressed by the later of May 31 or four weeks following the City of Winnipeg Public Works Department declaring the ground free of frost and permitting construction to commence, but no later than June 15 of each year.

E6.11 Traffic Control Devices

E6.11.1 Guide Signs

(a) Signs shall be maintained such that they function as designed. Project Co shall undertake the necessary OMR Services of the signs outlined in C17.2 to ensure that the desired message is available to motorists at all times. The following shall apply:

(i) Signing which does not function as designed shall be adjusted, relocated, and/or supplemented to meet the intended function. This includes ensuring signs are not obscured by other signs and do not provide conflicting messages;

(ii) All signs shall be maintained to the physical size, materials, and lettering as designed and constructed for the original installation;

(iii) Signs shall be kept clean and legible at all times;

(iv) Signs shall have an acceptable level of retroreflectivity. Generally, acceptable retroreflectivity can be determined by visual examination of the sign under night-time driving conditions. Signs that are reasonably considered to be deficient shall be replaced within 30 days of the visual inspection. Signs that exhibit reduced or blotchy retroreflectivity in excess of 25% of the sign area shall be considered to have unacceptable retroreflectivity. Sign reflectivity shall meet the requirements of ASTM D4956;

(v) Measurement of retroreflectivity will be determined in accordance with ASTM E1710 using a portable retroreflectometer;

(vi) Signs shall be replaced if sign-sheeting material delaminates from the sign blank by more than 10% of the surface area of the sign;

(vii) Sign posts shall be maintained straight and true and shall not lean more than 25 mm in 1 m in any direction;

(viii) Signs shall be kept level, within 25 mm in 1 m, and properly orientated for the Infrastructure User;

(ix) All post replacement of mounted signs shall be the same type as the original installation;

(x) Galvanized posts shall have the coating maintained such that no corrosion is visible;

(xi) The OMR Services of breakaway bases shall be constructed to meet the requirements of the design specifications;

(xii) Signs or billboards containing advertising or for any commercial purposes are not permitted. Project Co is responsible for the removal of all such signs/billboards; and

(xiii) Project Co shall remove any non-conforming signs or any unauthorized signs from the Lands. Election signs are permitted in accordance with the Neighbourhood Liveability By-law No. 1/2008, as amended.

(b) Project Co shall conduct a regular monitoring program for evaluating the condition of all signs within the OMR Infrastructure.

(c) Subject to C17.2, Project Co shall repair/replace any sign that is damaged, stolen, vandalized or which otherwise fails to meet the requirements of this E6.11.1, within the following timelines:

(i) Construction signs shall be inspected and realigned daily;

(ii) Non-critical warning signs shall be repaired/replaced within 48 hours;

(iii) Standard information/directional signs shall be repaired/replaced within 14 days; and

(iv) Non-standard information/directional signs shall be repaired/replaced within 60 days.

(d) For straightening, or otherwise maintaining signs, OMR Services shall be conducted within 21 days, unless the deficiency is such as to affect the effectiveness of the sign.

(e) For signs being maintained by the City of Winnipeg Traffic Services as outlined in C17.2, Project Co shall notify the City of Winnipeg Traffic Services Branch within three days of being aware of a deficiency.

E6.11.2 Pavement Markings

(a) Pavement and pathway/sidewalk markings shall be maintained such that they function as designed. Pavement markings shall be maintained to achieve the following general objectives:

(i) To provide positive lane delineation for the safe and orderly movement of traffic on the OMR Infrastructure;

(ii) To convey information to a vehicle operator without diverting the driver's attention; and

(iii) To complement regulations or warnings by other devices such as traffic signals or signs.

(b) All markings shall be maintained in a manner such that they are in proper repair, fully visible, complete and intact. Specifically but not exclusively, Project Co shall ensure that:

(i) Dirt or debris which obscures the markings is removed;

(ii) Breaks in markings caused by repair work, accident or any other reason, are reinstated;

(iii) Temporary markings for scheduled resurfacing are installed;

(iv) Markings comply with all design requirements and the following tolerances:

- Nominal 100 mm wide lines shall be applied to a tolerance of 100 mm to 110 mm;
- Nominal 200 mm line widths shall be applied to a tolerance of 200 to 210 mm;
- All direction dividing, lane dividing or continuity lines shall not exceed a maximum dimensional length deviation of +/- 100 mm for a specified 6.0 m or 3.0 m length of space; and
- All markings shall be applied at the proper location in accordance with the designed markings and in no case shall vary from the design location by more than 100 mm.

(v) All non-conforming markings are obliterated from the Transitway or Roadway; and

(vi) Painted pavement markings shall exhibit:

- No excessive (more than 10%) overspray;
- No splattering of paint;
- Clean definitive edges;
- No more than five tracks per km; and
- Uniform thickness.

(c) Project Co shall repaint pavement markings during the OMR Period to the following frequencies:

(i) The Transitway pavement markings shall be repainted twice a year; by June 1 and October 15 of each year;

(ii) AT path pavement markings shall be repainted once a year, by June 1 of each year; and

(iii) Park and Ride, and Kiss and Ride pavement markings shall be repainted once every two years, by October 15 of each year.

(d) Temporary markings following OMR Services shall be installed the same day as the OMR Services is performed.

(e) Permanent markings are required to be installed within 15 days of temporary markings being installed.

(f) Incorrect or confusing markings shall be removed immediately. This may involve remedial measures pending scheduling of permanent removal.

E6.12 Lighting

E6.12.1 Lighting shall be maintained such that they function as designed and shall be maintained to achieve the following general objectives:

(a) Conduct a review of the lighting bi-annually to ensure the plumbness of the poles and the structural integrity of the bases. Manitoba Hydro shall be notified by Project Co within two weeks of Project Co's inspection and shall correct any poles not plumb within 10 mm on 1 m;

(b) Lights shall be operational to the lumens they were designed to be at. Manitoba Hydro shall be notified by Project Co within four days of Project Co becoming aware or should have become aware of illumination not operating as designed.

E6.13 City Structures

E6.13.1 General

(a) All structural components and elements shall be inspected, rated, and measure in accordance with OSIM and OSRM.

(b) During the OMR Period, components and elements shall not have any quantity or value rated in poor condition. There shall be no material defects rated as severe or very severe.

(c) All components and elements shall be functioning as designed in a safe manner, with no performance deficiencies.

(d) All other requirements as identified in E6.13.2 to E6.13.22 shall be in addition to the requirements of E6.13.1.

E6.13.2 Noise Mitigation

(a) Project Co shall maintain all noise walls for structural integrity. All untreated cracks in sound wall shall be filled to prevent noise and protect the wall. There shall be no opening under the wall or between panels. The wall shall be maintained straight and true and shall not lean more than 25 mm in 1 m in any direction.

(b) Noise walls shall be inspected annually by the later of May 20 or four weeks following the City of Winnipeg Public Works Department declaring the ground free of frost and permitting construction to commence, but no later than June 15 of each year and repaired by September 1 of the same calendar year should it fail to meet the performance requirements.

E6.13.3 Roadway Grade

(a) There shall be a smooth transition on and off the bridge structures from the Transitway or Roadway. A smooth transition is defined as the grade on each approach slab and adjacent 100 m of pavement deviating less than 1% from the design grade. Any voids beneath the approach slab shall be filled if the approach slab grade deviates by more than 1% from the theoretical grade.

(b) Project Co shall undertake a topographic survey to address E6.13.3(a) to compare against the design grades. Any deviations shall be rectified.

E6.13.4 Wearing Surface

(a) The wearing surface on bridge structures shall meet the rutting requirements as stated for the Roadway in E6.2.3(i).

(b) High Performance Concrete wearing surfaces shall meet the requirements for concrete bridge deck noted below.

(c) Asphalt concrete pavement (“ACP”) wearing surfaces on bridge structures shall meet the general pavement maintenance requirements as stated for the Roadway in E6.2.3.

(d) The pavement markings on bridge structures shall meet the pavement lines and message requirements as stated for the Roadway in E6.11.2.

(e) Concrete bridge decks shall not have any untreated cracks greater than 0.1 mm in width and a linear measurement of 0.2 m of cracking per square metre of bridge deck area. If this is exceeded, the cracks are to be treated.

E6.13.5 Concrete Bridge Decks

(a) Unless noted otherwise, the bridge deck shall not have any chemical deterioration. No scaling should be visible.

(b) The underside of all concrete decks shall be free of stains resulting from deterioration, efflorescence and exudation.

(c) Any untreated cracking on the deck underside shall be limited to a maximum width of 0.3 mm.

(d) The following performance requirements for detailed condition surveys shall be met:

(i) Agreement Year 15 of the OMR Period:

- CSE test results showing a minimum of 90% of deck area with readings less negative than –0.300 mV; and
- Maximum average total chloride content of 0.010, by percent weight, at the top mat of reinforcing or 100 mm depth, whichever is less.

(ii) Agreement Year 20 of the OMR Period:

- CSE test results showing a minimum of 85% of deck area with reading less negative than –0.300 mV; and
- Maximum average total chloride content of 0.015, by percent weight, at the top mat of reinforcing or 100 mm depth, whichever is less.

(iii) Agreement Year 25 of the OMR Period:

- CSE test results showing a minimum of 80% of deck area with reading less negative than –0.300 mV; and
- Maximum average total chloride content of 0.020, by percent weight, at the top mat of reinforcing or 100 mm depth, whichever is less.

(e) Detailed condition surveys of the bridge deck shall be carried out in accordance with the requirements of the OSRM 10 years after Substantial Completion of the New Infrastructure and every five years thereafter.

(f) The copper sulphate electrode testing is based on the ASTM C876 method. Chloride content testing is performed in accordance with the "Standard Test Method for Chloride Content in Concrete Using the Specific Ion Probe" as described in SHRP-S-330, Appendix F – RT Symbol Design Details or "The Method of Field Determination of Total Chloride Content" as described in SHRP-S-328, Volume 6.

(g) For alternative deck protection systems Project Co shall identify the performance criteria to be met by the concrete bridge decks at Agreement Years 15, 20 and 25.

(h) Note: that the above criteria is applicable to all structural elements that are in contact with de-icing chemicals including curbs, barriers, medians, piers, abutments, wingwalls, tunnels, retaining walls and noise attenuation barriers, etc.

E6.13.6 Curbs, Barriers and Medians on Bridges and Approach Slabs

(a) Unless noted otherwise, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum surface area of 10% of the face and top of the curb, barrier or median.

(b) Untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum frequency of cracking shall be one crack every 2 m over the length of the bridge structure.

(c) There shall be no exposure of Utility Infrastructure voids or other formed voids.

(d) Differential movement in the horizontal or vertical direction shall be limited to 6 mm.

(e) Expansion joints shall be free for movement and not cracked or spalled.

(f) For bridge barriers, curbs, and sidewalks, the durable joint system should be expanded to the edges of the control joints with no gaps in the seal.

E6.13.7 Bridge and Pedestrian Rails

(a) Elements shall be free of collision damage, horizontal and vertical misalignment, improper guardrail laps, loose connections, and missing nuts and bolts. Steel components shall be free of deformation, cracks and corrosion. Anchor bolts shall have proper alignment and firm anchorage. There shall be no physical defects or chemical deterioration in the grout pads.

E6.13.8 Expansion Joints

(a) Expansion joints shall be vertically aligned, properly anchored, have freedom of movement and not have variation in the gap opening more than 10% along the length of the deck joint. There shall be no missing or loose bolts.

(b) All expansion joints shall capture and manage deck drainage such that it does not come into contact with the concrete and steel surfaces of other bridge elements.

(c) Steel components shall be free of deformation, cracks and corrosion.

E6.13.9 Bridge Deck Drainage Systems

(a) Potholes or the build-up of gravel or debris shall not cause any ponding on the bridge deck or impede the flow of water away from the bridge deck.

(b) There shall be no ponding of water along the shoulders or in the driving lanes. For the bridge and overpass, the location of drains shall not create ponding water or an icing hazard on the Roadway below.

E6.13.10 Steel Girders

(a) Steel girders shall be free of harmful corrosion, notches and cracks. A minimum of 8 mils of metalizing thickness or 3 mils of galvanizing thickness shall remain at Handback and the seal coat shall be intact.

(b) Bolted connections shall be free of deformation, warping and missing, worn, sheared or deformed fasteners. Web stiffeners shall not have any evidence of buckling. Girders shall not show any evidence of sags, buckling, bowing or twisting. All welds shall be free of cracks. There shall be no signs of damage or deterioration due to impacts or collisions.

E6.13.11 Precast Concrete Girders

(a) Unless noted otherwise for concrete components, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum area of 10%.

(b) Bolted connections shall be free of deformation, warping and missing, worn, sheared or deformed fasteners. Diaphragms shall not have any evidence of buckling. Girders shall not show any evidence of sags, buckling, bowing or twisting. All welds shall be free of cracks. There shall be no signs of damage or deterioration due to impacts or collisions.

E6.13.12 Hot-dip Galvanizing and Zinc-Metalizing Protection System

(a) The hot-dip galvanizing and zinc-metalizing protection systems applied to the steel components of the structures shall be free of signs of cracking, peeling, or chipping of the zinc coating.

E6.13.13 Structural Steel Coating System

(a) The structural steel coating system applied to the steel components of the structures shall be free from signs of cracking, peeling, chipping, or discolouration of the coating system.

E6.13.14 Sidewalks on Bridges and Approach Slabs

(a) Sidewalk surfaces shall be smooth but have adequate traction and be free of debris.

(b) Unless noted otherwise, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum surface area of 10% of the sidewalk area.

(c) Any untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre of sidewalk area.

(d) Steel components shall be free of medium or greater corrosion, notches, cracks, sheared bolts, and cracked welds.

E6.13.15 Bearings

(a) Bearings shall be functional and shall be free of all debris that may impede movement or rotation.

(b) Expansion bearings shall have available travel relative to temperature without excessive vibrations or movement under traffic. Coating system on bearings shall be functioning and intact. Component parts shall have proper alignment, proper contact surfaces and minimum resistance. Bearing pads and plates shall be in proper position. There shall be no physical defects or chemical deterioration in the grout pads. Elastomeric components shall be free of cracks and splits along the edges. Minor bulging of the elastomeric components shall be limited to 10% of the

component thickness. Anchor bolts shall have proper alignment and firm anchorage. Steel components shall be free of medium or greater corrosion, notches, cracks, sheared bolts and cracked welds.

E6.13.16 Pier Caps

(a) Caps shall not have any rotation or displacement.

(b) Unless noted otherwise for concrete components, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum area of 10%.

(c) Any untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre.

(d) Steel components shall be free of medium or greater corrosion, notches, cracks, sheared bolts and cracked welds.

E6.13.17 Abutment Backwalls and Bearing Seats

(a) There shall not be any significant loss of material below the backwall or bearing seat. The bottoms of bearing seats shall not be exposed due to soil settlement or other reasons.

(b) Where semi-integral and integral abutment systems are used, thermal void is maintained with no loss of backfill into the void from the approach embankment.

(c) Unless noted otherwise for concrete components, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum surface area of 10%.

(d) Any untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre.

(e) Steel components shall be free of medium or greater corrosion, notches, cracks, sheared bolts and cracked welds.

E6.13.18 Wingwalls and Earth Retaining Structures

(a) Wingwalls and earth retaining structures shall have proper vertical and horizontal alignment. The bottoms of these elements shall not be exposed due to soil settlement or other reasons.

(b) No loss of material from behind the retaining walls.

(c) Unless noted otherwise for concrete components, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum surface area of 10%.

(d) Any untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre.

(e) Steel components shall be free of medium or greater corrosion, notches, cracks, sheared bolts and cracked welds.

E6.13.19 Pier Shafts

(a) Piers shall not have any evidence of collision damage or damage due to ice or debris.

(b) There shall be no signs of heaving or settlement.

(c) Unless noted otherwise for concrete components, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum surface area of 10%.

(d) Any untreated cracking of concrete components shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre.

E6.13.20 Concrete Finishes

(a) Concrete finishes in visible areas shall not be stained, chipped or peeling.

(b) Where sealers have been applied to the concrete, the sealers shall not be chipped, discoloured, peeling, or removed.

E6.13.21 Tunnel Structures

(a) Unless noted otherwise for concrete components, there shall be no chemical deterioration. Any scaling shall be limited to light scaling over a maximum area of 10%.

(b) Any untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre.

E6.13.22 Other Grade Separation Structure Elements

(a) Other bridge structure elements not listed in these requirements shall be functioning as designed throughout the OMR Period.

E6.14 Sign Structures

E6.14.1 Pedestal

(a) Unless noted otherwise for concrete components, there shall be no physical defects or chemical deterioration. Any scaling shall be limited to light scaling over a maximum surface area of 10%.

(b) Any untreated cracking shall be limited to a maximum width of 0.3 mm. The maximum linear measurement of cracking shall be 1 m of cracking per square metre.

E6.14.2 Column

(a) Columns shall be properly aligned with no bends, bows or kinks.

(b) Aluminum or steel components shall be free of corrosion, notches, cracks, sheared or loose bolts and cracked welds.

E6.14.3 Connections/Bearings

(a) There shall be no missing anchor nuts and all nuts shall be fully torqued. Anchor bolts shall have proper alignment and firm anchorage. There shall be no physical defects or chemical deterioration in the grout pads. All concrete in the area of the connections shall be sound. Welds and connections shall be free of cracks and defects.

E6.14.4 Superstructure Elements

(a) The superstructure is defined as that portion of the sign structure that is attached to the support columns and spans between the columns.

(b) Component elements shall not show any evidence of sags, buckling, bowing or twisting. Bolted connections shall be free of deformation, warping, and missing, loose, worn, sheared or deformed fasteners.

(c) Steel elements shall be free of corrosion, notches and cracks.

(d) All welds shall be free of cracks.

E6.14.5 Coatings

(a) Coatings shall be intact and effective in preventing corrosion and loss of section. There shall be no rusting, scaling, peeling, blistering, discolouration or other defects.

E6.14.6 Other Sign Structure Elements

(a) Other sign structure elements not listed in these requirements shall be functioning as designed throughout the OMR Period.

E6.15 Public Art

E6.15.1 The Performance Requirements shall follow the requirements set out in Schedule 23: Public Art

PART F HANDBACK REQUIREMENTS

F1. GENERAL

F1.1 Upon the Expiry Date, the OMR Infrastructure shall meet or exceed the requirements in this section.

F1.2 The Handback Requirements do not apply to Stage 1 Infrastructure.

F1.3 The Stage 1 handback inspection shall follow E1.15.3(b).

F2. TRANSITWAY AND ROADWAY HANDBACK REQUIREMENTS

F2.1 Each Transitway and Roadway pavement shall have at least a 20 year service life remaining with no major repairs required in the following five years. Evaluation of these components is to begin after 25 years of service has elapsed. The condition will be determined by the City who may engage a subject matter expert as required to aid in the assessment.

F2.2 Condition of Pavement

F2.2.1 The pavement shall meet or exceed the following requirements:

(a) Cross-slope and superelevation <0.5% deviation from design rate;

(b) Pavement surface width shall not be less than design width;

(c) Concrete IRI of 2.4 m/km for the Transitway only;

(d) 1 km average rutting < 10 mm for asphalt pavements;

(e) 100 m section average rutting < 15 mm;

(f) Isolated area rutting < 25 mm; and

(g) No ponding greater than 10 mm in depth and 10 m^2 in area.

F2.2.2 The Transitway shall be handed back as a concrete pavement structure with no asphalt overlay, with the exception of bridge deck overlays for City structures as set out in C7.7.2(a).

F2.3 Pavement Surface Condition

F2.3.1 The pavement surface, including lanes, shoulders, platforms, shall be free of any evidence of structural weakness, pitting, potholes, ravelling, segregation, scaling, delamination, localized roughness and all other deficiencies. All cracks and joints shall be sealed. The pavement surface shall be free and clear of dirt, sand, and other debris and shall be joint sealed.

F2.4 Condition of All Guide Signs

F2.4.1 All signs in C17.2 on the OMR Infrastructure shall be in-place and functioning as designed and shall meet or exceed the following:

(a) Have an acceptable level of retroreflectivity. No signs shall exhibit reduced or blotchy retroreflectivity in excess of 25% of the sign area;

(b) Guide signs shall have a minimum retroreflectivity of 250 cd/lux/m^2 at an observation angle of 0.2° and a light entry angle of -4°;

(c) Information signs shall have a minimum retroreflectivity of 170 cd/lux/m^2 at an observation angle of 0.2° and a light entry angle of -4°;

(d) Signs shall exhibit no sign-sheeting material delaminations from the sign blank;

(e) Sign posts shall be maintained straight and true and shall not lean more than 25 mm in 1 m in any direction;

(f) Signs shall be kept level, within 25 mm in 1 m, and properly orientated for the Infrastructure User;

(g) Galvanized or painted posts shall have no visible corrosion; and

(h) All posts of mounted signs are of the same type.

F2.5 Condition of Road Side Safety Devices

F2.5.1 All Road Side Safety Devices on the OMR Infrastructure shall be installed and functioning as designed and meet or exceed the following:

(a) All Road Side Safety Devices shall be within 6 mm maximum for plumb and grade;

(b) All posts are sound and vertical;

(c) There shall be no tears, holes, or sharp edges; and

(d) All components shall be securely fastened with the designed fasteners.

F2.6 Condition of Sidewalk and AT Path

F2.6.1 Each sidewalk and AT path shall have no major repairs required in the following five years.

F2.6.2 All AT paths and sidewalks shall be installed and functioning as designed and meet or exceed the following:

(a) The pavement surface shall be free of pitting, potholes, raveling, scaling, delamination, localized roughness, localized deficiencies, and other deficiencies;

(b) Broken, spalled or damaged concrete shall be replaced where required to restore functionality;

(c) Differential elevation at joints or cracks with kicks that exceed 5 mm shall be repaired or replaced to remove the differential elevation and remove any tripping hazard;

(d) Concrete that is cracked in multiple locations or has a rough surface texture within the same general area of sidewalk and or miscellaneous concrete slabs or otherwise results in a discontinuity that may pose a tripping hazard or be a safety concern shall be removed and replaced;

(e) All Asphaltic Concrete Pavement (ACP) joints and transverse and random cracks:

(i) Measuring 5 mm to 15 mm in width shall be routed and sealed with a sealant acceptable to the City;

(ii) Measuring 16 mm and 25 mm in width shall be spray patched; and

(iii) Measuring greater than 25 mm in width shall be replaced.

(f) ACP longitudinal cracking measuring greater than 20 mm in width and greater than 15 m in length shall be replaced;

(g) ACP with edge cracking, edge sloughing, or causing an inconsistent cross grade along the outside 250 mm of the pavement shall be replaced;

(h) All concrete pavement joints and transverse and random cracks:

(i) Measuring greater than 10 mm in width shall be replaced.

(i) Water ponding on a sidewalk or AT path deeper than 10 mm and larger than an area of 3 m^2 shall be replaced;

(j) Areas that are failed or have alligator cracking shall be replaced; and

(k) Areas of localized roughness are to be repaired. Localized roughnesses include any kicks in excess of 5 mm.

F2.6.3 AT paths and sidewalk surface shall be clean and free of dirt, sand and other debris.

F2.7 Condition of Barriers

F2.7.1 All barriers and fences in the OMR Infrastructure shall be installed and functioning as designed and meet or exceed the following:

(a) All missing pieces and/or areas of structural weakening shall be replaced.

F2.8 Condition of Lighting

F2.8.1 All lighting systems and related components on the OMR Infrastructure shall be installed and function as designed and meet or exceed the following:

(a) Poles shall be plumb within 10 mm in 1 m;

(b) Poles and other mounting hardware shall be clean and neat, with no structural corrosion and all visible corrosion areas are to be re-galvanized;

(c) Concrete bases shall be structurally adequate for the design loads; and

(d) Each individual light/luminaire shall be operational, provide light output in accordance with the manufacturer's rated design parameters, and overall illumination in accordance with the Detailed Designs.

F2.8.2 Project Co shall cooperate with the City to coordinate the transfer of supply of electrical power at the end of the OMR Period.

F2.9 Condition of Drainage System

F2.9.1 All components of the drainage system on or related to the OMR Infrastructure shall function as designed. All drains, storm sewers, manholes, and other appurtenances shall be fully operational and clear of any debris or accumulated material. Any broken frame covers and/or rings shall be replaced and there shall be no standing water greater than 50 mm in depth.

F2.9.2 The drainage system shall be flushed and televised in the last year of the OMR Period, with no rating of an SPG 4 or 5, including catch basins and leads.

F2.9.3 The drainage system shall have at least a 20 year service life remaining with no major repairs required in the next five years.

F2.10 Condition of Concrete Curbs, Gutters, Median and Barriers (Non-Structure Related)

F2.10.1 All concrete components on the OMR Infrastructure shall be installed and function as designed and meet or exceed the following:

(a) Broken, spalled or damaged concrete shall be replaced where required to restore functionality;

(b) Curb height shall meet the requirements of the design specifications and in no case shall be less than 200 mm in the stations and 150 mm in all other locations;

(c) Differential elevation at joints or cracks that exceeds 5 mm shall be repaired or replaced to remove the differential elevation and remove any tripping hazard;

(d) Concrete that is cracked in multiple locations within the same general area or otherwise results in a discontinuity that may pose a tripping hazard or be a safety concern shall be removed and replaced; and

(e) Concrete surfaces that exhibit scaling and results in a rough surface texture shall be removed and replaced.

F2.11 Condition of Landscaping

F2.11.1 All landscaping within the property limits identified in Appendix C of Schedule 12 – Lands and Identified Encumbrances shall be in place and function as designed and meet or exceed the following:

(a) There are no bare spots greater than 1 m^2 in size;

(b) There is a minimum of 80% ground cover for any 100 m^2 area;

(c) No noxious weeds are present;

(d) Grass shall not exceed 100 mm in height, except in low mow or no mow areas as approved in the design;

(e) Shrubs shall be trimmed; and

(f) All trees planted by Project Co are alive and in good health. Any trees originally planted by Project Co that have died shall be removed and replaced.

F2.11.2 Project Co shall cooperate with the City to coordinate the transfer of any seasonal water services at the end of the OMR Period.

F2.12 Condition of Pavement Markings

F2.12.1 All pavement markings on the OMR Infrastructure shall be freshly installed at Handback and function as designed and meet or exceed the following:

(a) Nominal 100 mm wide markings shall be within a tolerance of 100 mm to 110 mm;

(b) Nominal 200 mm wide markings shall be within a tolerance of 200 to 210 mm;

(c) All direction dividing, lane dividing or continuity markings shall not exceed a maximum dimensional length deviation of +/- 100 mm for a specified 6.0 m or 3.0 m length of space;

(d) All markings shall be at the proper location in accordance with the designed markings and in no case shall vary from the design location by more than 100 mm; and

(e) All painted markings shall display the following:

(i) No excessive (more than 10%) overspray;

(ii) No splattering of paint;

(iii) Clean definitive edges; and

(iv) No more than five tracks per km.

F3. STRUCTURE HANDBACK REQUIREMENTS

F3.1 General

F3.1.1 At the end of the OMR Period, the grade separation structures shall be turned back to the City. For the purposes of this section the term “structure”: shall include bridge structures, tunnels, culverts, earth retaining structures, roadside safety devices, and noise attenuation barriers. The structures shall be in adequate condition and function as designed with no loss of structural strength and shall meet the Handback Requirements at the end of the OMR Period. Project Co shall complete any required OMR Services prior to the end of the OMR Period to meet the required functionality state and handback condition prior to returning the structure to the City’s control and management.

F3.1.2 Notwithstanding the Handback Requirements stated in this section, all structural components and elements shall be inspected, measured, and rated in accordance with OSIM and OSRM. The following will be considered to be in Non-Conformance:

(a) Any component or element with quantity or values rated in fair or poor condition;

(b) Any material defect rated as severe or very severe;

(c) Any performance deficiency; and

(d) Any element or component that is not functioning as designed, or in a safe manner.

F3.2 Individual Component Requirements

F3.2.1 With the exception of F3.2.3, structures shall meet the performance requirements specified in E6.13 upon expiry of the Project Term.

F3.2.2 Concrete bridge decks shall meet the performance requirements stated in F3.2.3 upon expiry of the Project Term.

F3.2.3 Concrete Bridge Decks

(a) Unless noted otherwise the bridge deck shall not have any chemical deterioration.

(b) Concrete bridge decks and wearing surfaces cast-to-grade shall not have any untreated cracks greater than 0.1 mm in width. The maximum linear measurement of cracking shall be 0.2 m of cracking per square metre of bridge deck area.

(c) The underside of all concrete decks shall be free of stains resulting from deterioration, efflorescence and exudation.

(d) Any untreated cracking on the deck underside shall be limited to a maximum width of 0.3 mm.

(e) In the final agreement year of the OMR Period, the following Handback Requirements shall be met with respect to the City’s standard deck protection system as identified in C7.7.2:

(i) CSE test results showing a minimum of 75% of deck area with reading less negative than –0.300 mV;

(ii) Maximum total average chloride content of 0.025, by percent weight, at the top mat of reinforcing or 100 mm depth, whichever is less;

(iii) The deck area shall not be delaminated or debonded as determined by chain drag testing;

(iv) Deck testing shall be carried out in accordance with the requirements of OSRM*;*

(v) The copper sulphate electrode testing is based on the ASTM C876 method;

(vi) Chloride content testing is performed in accordance with the "Standard Test Method for Chloride Content in Concrete Using the Specific Ion Probe" as described in SHRP-S-330, Appendix F – RT Symbol Design Details, "The Method of Field Determination of Total Chloride Content" as described in SHRP-S-328, Volume 6 or an approved equivalent test method; and

(vii) For alternative deck protection systems Project Co shall identify the performance criteria to be met by the concrete bridge deck at Agreement Year 30. This performance criteria shall be set to ensure that the maximum average total chloride content at the level of the deck reinforcing is below the deck reinforcing's corrosion threshold.

F3.2.4 Other Structural Elements

(a) Note that the criteria laid out in F3.2.3 is applicable to all structural elements that are in contact with de-icing chemicals including bridge structures, tunnels, culverts, earth retaining structures, roadside safety devices, noise attenuation barriers etc.

F3.2.5 Noise Attenuation

(a) All road traffic noise mitigation elements by Project Co's design on the OMR Infrastructure shall be installed and functioning as designed and meet or exceed the following:

(i) Panels shall be leveled. The noise barrier shall be uniform and shall neither tilt off axis or bow. The wall shall be maintained straight and true and shall not lean more than 25 mm in 1 m in any direction. Elevation alignment (top and bottom) tolerances of the panel shall be no more than 15 mm.

F4. PUMP STATION HANDBACK REQUIREMENTS

F4.1 All mechanical, electrical, civil, structural and architectural components of the pump station are to be handed back at the end of the OMR Period in a condition considered to be 70% new. Evaluation of these components is to begin after 25 years of service has elapsed. The condition will be determined by the City who may engage a subject matter expert as required to aid in the assessment.

F4.2 Project Co shall cooperate with the City to coordinate the transfer of utilities (including electricity, natural gas, communications, and water and sewer) at the end of the OMR Period.

F5. STATION HANDBACK REQUIREMENTS

F5.1 All stations, including but not limited to, structures, shelters, canopies, benches, bike lockers, information kiosks, flag poles, totems, signage, heaters, fences, etc. and all other major components within the stations are to be handed back in working order in a condition requiring no major repairs required in the next five years. Working order can be interpreted as the absence of rust, dents in structures/signage, and significant damage to the aforementioned components. Evaluation of these components is to begin after 25 years of service has elapsed. The condition will be determined by the City who may engage a subject matter expert as required to aid in the assessment.

F5.2 No rust, signs of staining, streaking, leaking or fading shall be present on any appurtenances within the stations.

F5.3 Project Co shall cooperate with the City to coordinate the transfer of utilities (including electricity, natural gas, communications and water and sewer) at the end of the OMR Period.

F6. PARK AND RIDE, KISS AND RIDE, AND BUS STAGING AREAS HANDBACK REQUIREMENTS

F6.1 Each Park and Ride facility, Kiss and Ride facility and bus staging area pavement shall have at least a 20 year service life remaining with no major repairs required in the following five years. Evaluation of these components is to begin after 25 years of service has elapsed. The condition will be determined by the City who may engage a subject matter expert as required to aid in the assessment.

F6.2 Condition of Pavement

F6.2.1 The pavement shall meet or exceed the following requirements:

(a) Cross-slope and superelevation <0.5% deviation from design rate;

(b) No major rutting. 100 m section average rutting < 15 mm;

(c) Isolated area rutting < 25 mm; and

(d) No ponding greater than 10 mm in depth and 15 m^2 in area.

F6.3 Pavement Surface Condition

F6.3.1 The pavement surface, including lanes, shoulders, platforms, shall be free of any evidence of structural weakness, pitting, potholes, ravelling, segregation, scaling, delamination, localized roughness and all other deficiencies. All cracks and joints shall be sealed. The pavement surface shall be free and clear of dirt, sand and other debris and shall be joint sealed.

F6.4 Condition of Drainage System

F6.4.1 All components of the drainage system on or related to the OMR Infrastructure shall function as designed. All drains, storm sewers, manholes, and other appurtenances shall be fully operational and clear of any debris or accumulated material. Any broken frame covers and/or rings shall be replaced.

F6.4.2 The drainage system shall be flushed and televised in the last year of the OMR Period, with no rating of an SPG 4 or 5, including catch basins and leads.

F6.4.3 At the end of the OMR Period, the drainage system shall have at least a 20 year service life remaining with no major repairs required in the next five years.

F6.5 Condition of Lighting

F6.5.1 All lighting systems and related components on the OMR Infrastructure shall be installed and function as designed and meet or exceed the following:

(a) Poles shall be plumb within 10 mm in 1 m;

(b) Poles and other mounting hardware shall be clean and neat, with no structural corrosion and all visible corrosion areas are to be re-galvanized;

(c) Concrete bases shall be structurally adequate for the design loads; and

(d) Each individual light/luminaire shall be operational, provide light output in accordance with the manufacturer's rated design parameters, and overall illumination in accordance with the Detailed Designs.

F6.5.2 Project Co shall cooperate with the City to coordinate the transfer of supply of electrical power at the end of the OMR Period.

F6.6 Condition of Pavement Markings

F6.6.1 All pavement markings on the OMR Infrastructure shall be freshly painted at handback, installed and function as designed and meet or exceed the following:

(a) All markings shall be at the proper location in accordance with the designed markings and in no case shall vary from the design location by more than 100 mm; and

(b) All painted markings shall display the following:

(i) No excessive (more than 10%) overspray;

(ii) No splattering of paint; and

(iii) Clean definitive edges.

F7. PUBLIC ART HANDBACK REQUIREMENTS

F7.1 The Public Art and associated components shall be handed back in working order and in a condition requiring no major repairs in the next five years. Evaluation of these components is to begin after 25 years of service has elapsed. The condition will be determined by the City's public art liaision.

F7.2 No rust, signs of staining, streaking, leaking or fading shall be present on any pieces of the Public Art.

Appendix A – City of Winnipeg Southwest Transitway Stage 2 – Transitway Design Requirements

Appendix B – City of Winnipeg Southwest Transitway Stage 2 – Functional Design Report (Revised 2015-10-08)

Appendix C – Preliminary Engineering Study for Upgrading the Pembina Highway Underpass (CN Rivers Sub. Mile 2.65)

Appendix D – Standard Structural Specifications (Version 4.1)

Appendix E – Standard Construction Details

Appendix F – RT Symbol Design Details

Appendix G – Bus Detection System

Appendix H – CN Guidelines

Appendix I – Manitoba Conservation and Water Stewardship Environment Act Licence No. 3121

Appendix J – Identification Standard, City of Winnipeg Water and Waste Department (May 31, 2013)

Appendix K – Electrical Design Guide, City of Winnipeg Water and Waste Department, October 31, 2013)

Appendix L – Policy on Snow Clearing and Ice Control, City of Winnipeg, September 28, 2011

Appendix M – Guideline for Mill and Fill Pavement Rehabilitation Method, City of Winnipeg, 2010

Appendix N – Tree Removal Guidelines, City of Winnipeg, March 1, 2014

Appendix O – Tree Planting Details and Specifications Downtown Area and Regional Streets, City of Winnipeg, May 1, 2009

Appendix P – Drainage Criteria Manual, City of Winnipeg

Appendix Q – Accessibility Design Standards, City of Winnipeg, May 2010

Appendix R – CPTED Guiding Principles, City of Winnipeg, May 2006

Appendix S – Universal Design Policy, City of Winnipeg, December 5, 2001

Appendix T – Universal Design Guiding Principles, City of Winnipeg, January 2006

Appendix U – Transportation Standards Manual, City of Winnipeg, 2012 Update

Appendix V – Busway Planning and Design Manual, City of Winnipeg Transit Department, September 2004

Appendix W – Manual of Temporary Traffic Control on City Streets, City of Winnipeg (2015)

Appendix X – Manual for the Production of Construction Drawings, City of Winnipeg, Works and Operations Division, November 1984

Appendix Y – Public Works Department Parks and Open Space Division Management Information Manual, Volume 1: Maintenance Guidelines, November 2, 2001

Appendix Z – Inertial Profiler Profile Summary Sheet

Appendix AA – (This Appendix is intentionally blank)

Appendix BB – Acceptable Tree Species for Boulevard Planting, City of Winnipeg, November 2011

Appendix CC – Boulevard Tree Planting Guidelines as Required Under Development Agreements, City of Winnipeg, November 2011

Appendix DD – Pembina Highway Underpass: Geometric Design Criteria

Appendix EE – Winnipeg Transit Comfort Stations (Bus Operator Washrooms)

Appendix FF – IGF Station Bus Parking for Post-Event Service

Appendix GG – IGF Station Overhead Pedestrian Walkway

Appendix HH – U of M Southwood Lands Survey (Revised 2016-01-28)

Appendix II – Proposed Brenda Leipsic Dog Park

Appendix JJ – AT Path Functional Design – Pembina Highway at Jubilee Avenue

Appendix KK– U of M Land Drainage

Appendix LL– Southwest Transitway (Stage 2) and Pembina Highway Underpass Project - Baseline Noise Study

Appendix MM – Bus Rapid Transit Project Southwest Transitway Corridor Geotechnical Investigation – Technical Memorandum

Appendix NN – Access for Semi-Trailers for IGF Events

Appendix OO – Thomson Funeral Home and Cemetery AT Path Connection

Appendix PP – AT Path Recommended Illumination

Appendix QQ – (Draft) Natural Area Appraisal and Removal Guidelines, City of Winnipeg

Appendix RR – Woodland Restoration Specification to Meet Compensation Requirements

Appendix SS – Fairway Woods Visual Natural Screening

Appendix TT – AT Path for Chevrier at Pembina

Appendix UU – Tree Removals in U of M Southwood Lands and University of Manitoba

Appendix VV – Realigned Roadway through Southwood Lands

Appendix WW – Westbound Southpark Drive Bus Stop Location (Revised 2016-02-16)

Appendix XX – Design Submittal Requirements

Appendix YY – NHL Heritage Classic Ice Plant Access Detail